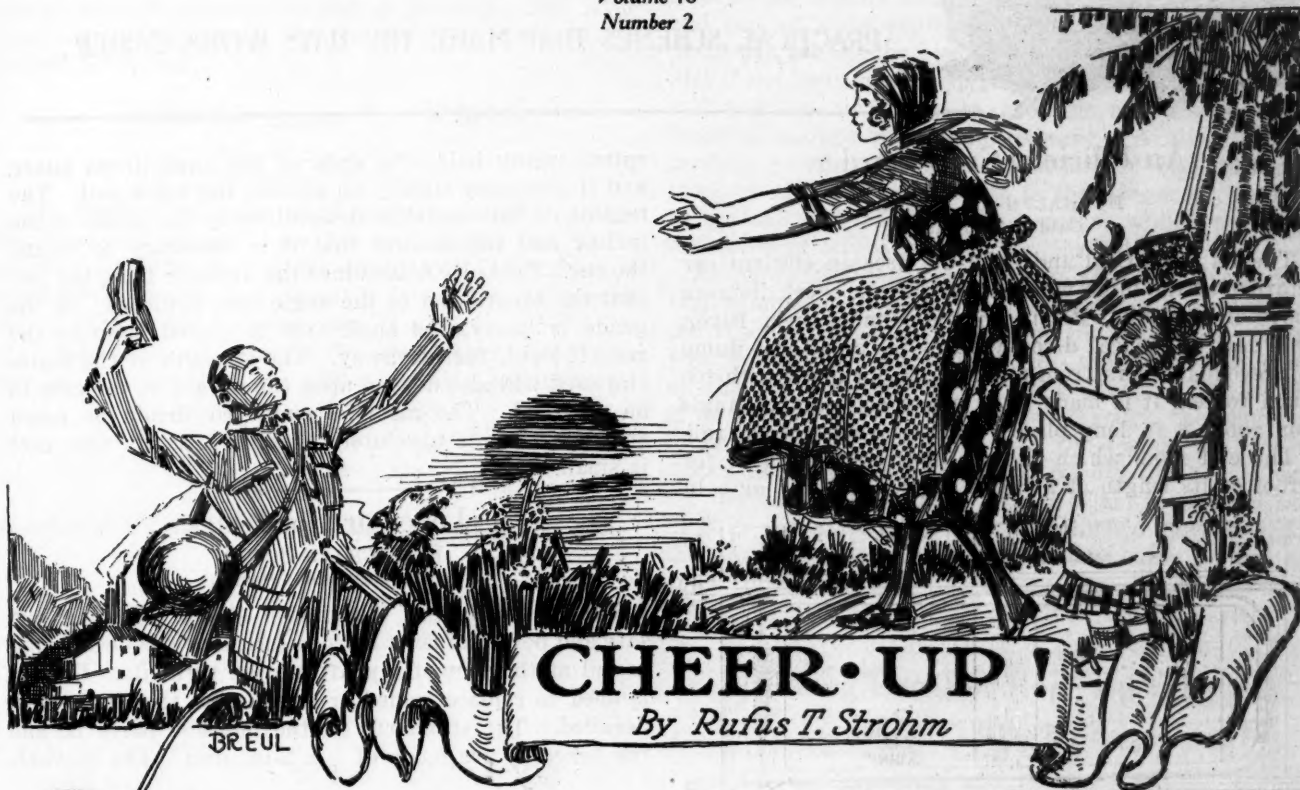


COAL AGE

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CHEER-UP!

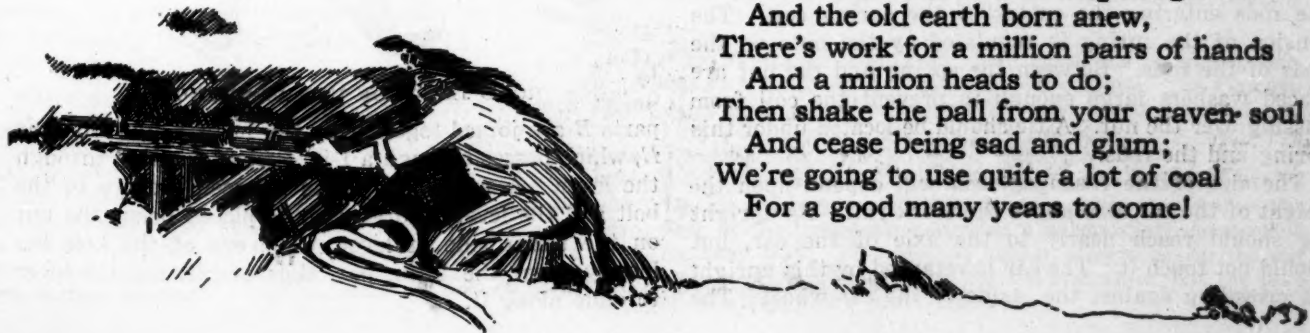
By Rufus T. Strohm

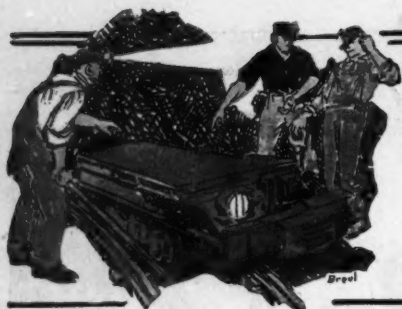


e've all been hectored and sorely tried
By the war's demands, it's true,
But we've met them all, and we've gained, besides,
From the service we've gone through;
For we've put an end to the cannon's roll
And the beating of the drum;
Now let's dig in to supply the coal
For the bang-up years to come!

The world's been shorn of its wonted trade
Till its shelves are standing bare,
And the countless products that must be made
Call for labor everywhere;
So can the grief and the gloom and dole;
Away with the twiddling thumb;
We're bound to burn quite a bit of coal
For a good many years to come.

With soldiers back from the foreign lands
And the old earth born anew,
There's work for a million pairs of hands
And a million heads to do;
Then shake the pall from your craven soul
And cease being sad and glum;
We're going to use quite a lot of coal
For a good many years to come!





IDEAS AND SUGGESTIONS

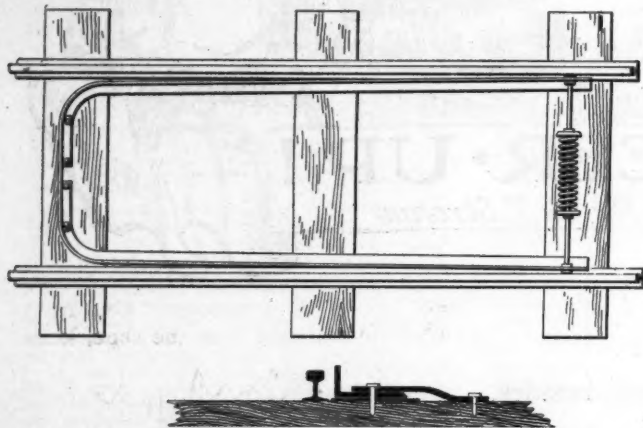
PRACTICAL SCHEMES THAT MAKE THE DAY'S WORK EASIER

An Efficient Car Retarder

BY RALPH L. MAYER
California, Penn.

The La Belle Coal and Coke Co. uses an efficient car retarder at the mine which it operates a short distance above Brownsville, Penn., on the Monongahela River. This device is placed directly below the cross-over dump to prevent the cars from striking the kickback with too much force. It is made from pieces of L-shaped angle iron about 8 ft. long placed on the inside of each rail.

The end from which the car approaches is bent for a foot of its length at a slight angle. A pivot, or bolt,



DEVICE PREVENTS CARS FROM STRIKING KICKBACK WITH TOO MUCH FORCE

passes through a hole made near its end, and down into the tie upon which it rests. An iron plate is placed between the tie and the angle iron, to prevent wear. The pivot passes through this plate as well as through a brace placed on top of the angle iron. This brace is made long enough to extend out beyond the side of the angle iron, where it is bent down and spiked fast to the tie. The space between it and the tie should be sufficient to allow free movement of the angle iron.

The free ends of the angle irons have iron rods fastened rigidly to them. The length of these rods should be about one-third the width of the track gage, and their free ends should be threaded for nuts. A stiff spiral spring is placed between these two rods, the ends of the rods entering the center of the spring coil. The tension of the spring is regulated by the nuts on the ends of the rods. Between the spring and the nut are placed washers large enough to prevent the coil from passing over the nut. A tie should be located under this spring and the rods.

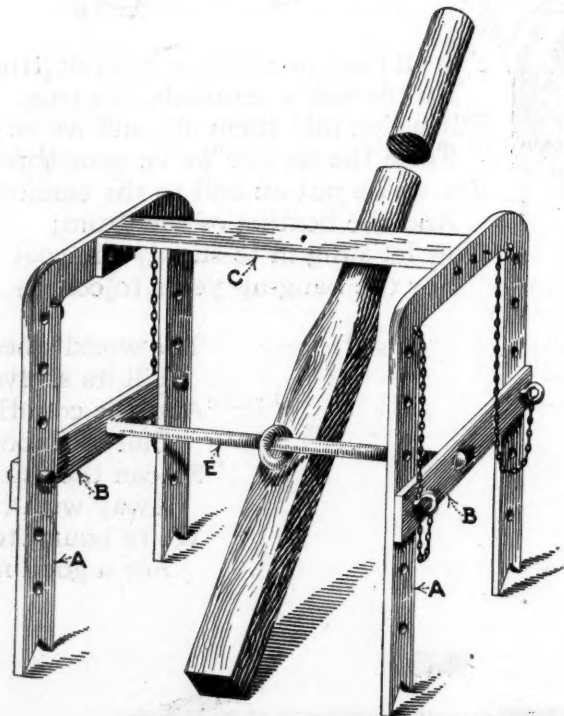
The size of the L-shaped iron will depend upon the height of the car axle above the track rail. Its upright leg should reach nearly to the axle of the car, but should not touch it. The car is retarded by this upright leg crowding against the inside of the car wheel. The

spiral spring holds the ends of the angle irons apart, and if necessary tightly up against the track rail. The tension on this spring is determined by the grade of the incline and the amount that it is necessary to retard the car. This also determines the distance from the rail that the hinged end of the angle iron is placed. If the grade is heavy, the angle iron is placed close to the rail; if light, farther away. The strength of the material used will also depend upon the weight of the cars to be retarded. The material employed should be much stronger than is absolutely necessary, as its first cost is small.

Lever or Road Jack

BY RICHARD BOWEN
West Pittston, Penn.

The accompanying illustration shows a simple, yet safe and powerful lever or road jack that has been found useful at the foot of a shaft and on turnouts. Here it is used to replace loaded or empty cars that have been derailed. The standards *A*, the movable parts *B*, and the brace *C*, are made of $\frac{1}{2}$ x 2-in. iron. The movable



ROAD JACK FOR USE AT TURNOUTS

parts *B* are joined together by the $\frac{1}{2}$ -in. round iron bar *E*, which passes through a 1-in. eyebolt running through the lever. A washer is placed between the eye of the bolt and the lever, and another is placed below the nut on the under side of lever. The eye of the bolt fits loosely over the $\frac{1}{2}$ -in. bar, thus permitting the lever to slide along it.

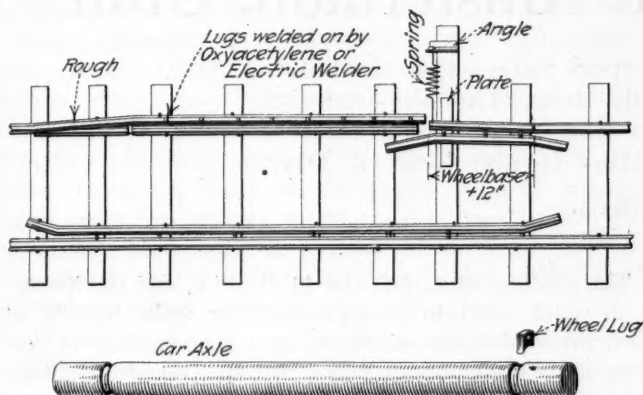
The movable device can be adjusted at any height on the standards by means of pins, which are hung in place by small chains that should be the same length as the height of the standard. The distance between the standards should not be greater than the width between the bumpers of the cars. This permits the device to be placed as close against the car as possible. The lever can be made any length, but the weight arm should not exceed 18 inches.

Tester for Loose Car Wheels

BY E. E. JONES
Stotesbury, W. Va.

The illustration shows what might be called a "tester for loose car wheels." So far as I know, this is an entirely new idea and might have possibilities from a patent standpoint; but since it is almost entirely a safety idea, I am going to pass it along.

It might be of interest to those connected with mining to know that on 450 mine cars put through



DETAILS OF A CAR-WHEEL TESTER

this device 125 loose wheels were found. Also that before this device was installed it was common to have expensive delays due to wheels coming off when cars were passing over frogs and switches, and that wrecks arising from this cause were common. This tester should be installed in such a way that cars coming from the dump will pass over the section of track on which the device is located.

It will be noticed that I have marked one of the rails as "rough rail." The idea of this is that car wheels passing over this rough rail will make sufficient noise to attract attention, thus allowing the bad car to be switched out of the trip. It will also be noticed that the car is not derailed, but passes back on to the main line and can thus be switched out on the siding for cripple cars.

It might be mentioned that this tester is only one of the many good things to be found around the E. E. White Coal Co.'s plants which have gone far toward making them the most prosperous and "up to the minute" plants in the United States.

MANY DIFFERENT kinds of coal have been tested and analyzed by the Bureau of Mines in its investigations relating to the purchase and use of fuel by the government and to safety in coal mining. Advantage has been taken of the opportunity thus afforded to obtain information as to the differences in weight of the various coals. A study of conditions indicates that heavier weights may be expected for coals of high fixed carbon than for those of low carbon content.

Rearranging the Terminal Block

BY MACHINE-RUNNER
Sullivan, Ind.

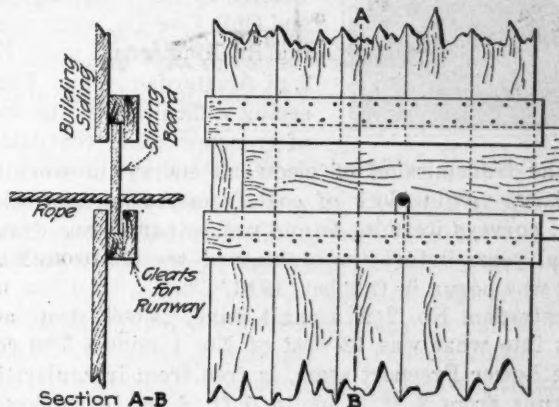
When a certain well known make of coal cutter comes from the factory the fuse or terminal block is directly on top of the gear case, where all the dirt and bits of slate which fly while the ratchet jack is being set fall on the block. This soon becomes full of dirt if not cleaned off frequently and causes the negative and positive terminals to arc, thereby burning the terminal clamps and clamp screens. Another disadvantage arising from this location of the terminal block on top of the gear case is the danger of coming in contact with the positive terminal while operating the different levers located near the block.

Better results have been secured after the electrician was persuaded to move the terminal block around on the right-hand side directly over the resistance. Two $\frac{1}{2}$ -in. holes drilled and tapped into the motor casing is all that is necessary to make the change. The cable is then brought into the machine through the original cable clamp, but passes on over the top of the motor casing to the new location of the terminal block. When the block is bolted in place a piece of tin is inserted behind it, and after the bolts are tightened down to hold the block in place the tin is bent in such a manner as to form a shield for the block, thus preventing any substance from falling directly upon the terminals.

Sliding Door for Rope Opening

BY E. P. HUMPHREY
Upper Lehigh, Penn.

To keep the cold wind from blowing into an engine room the device here shown is a winner. The light sliding board is notched and slipped over the rope, loose



DETAILS OF A SLIDING DOOR FOR USE IN ENGINE ROOM

runways built and the problem is solved. Of course, the board must be long enough to cover the opening when the rope is at either end of its lateral travel.

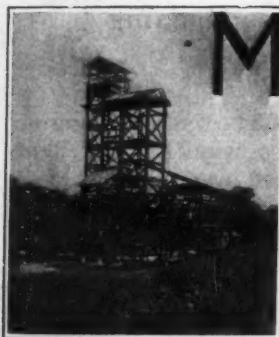
IN NUMEROUS INSTANCES about mines the increasing burden on a retaining wall threatens its collapse. The Pennsylvania R.R. recently successfully solved a problem of this kind as follows: The bulging retaining dry wall was strengthened by a series of buttresses each 4 ft. wide placed 18 ft. apart. The buttresses were connected at the top by a concrete wall built on top of the dry wall. The base of the buttresses rested on a substantially constructed masonry wall. This method cannot always be carried out on account of lack of space for the buttresses, but the plan is effective where practicable.



Modern Shaft Mine at Amsterdam, Ohio

Shaft Operation in the Lower Freeport Seam—Coal Contains Some Sulphur and Quite a Little Bone, Though Analysis Shows That It Is a Good Fuel for Both Steam and Domestic Use—Present Capacity of the Mine Is 800 Tons a Day.

BY JACK L. BALL
Amsterdam, Ohio



MODERN power facilities, simplicity, thoroughness in the design of the trolley (especially its screening and loading equipment) and economical operation—this was the goal desired by the Youghioghny and Ohio Coal Co. when opening its Amsterdam mine No. 2, at Amsterdam, Ohio. Foreseeing difficulties in the way of transportation, ventilation

and the transmission of electrical energy in working this large virgin block of coal from Amsterdam mine No. 1, surveys were made and preliminary plans drawn several years before the sinking of the shaft at Mine No. 2 was begun in October, 1916.

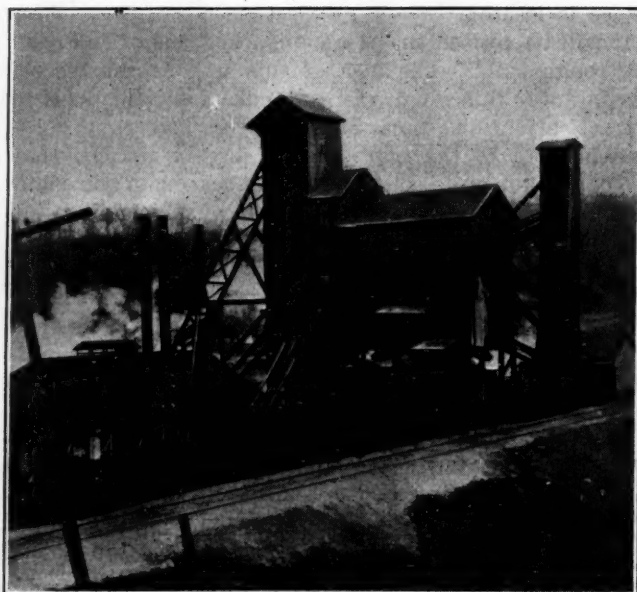
Amsterdam No. 2 is a shaft mine, 243 ft. deep, and opens into what was 12-west of No. 1 mine. The coal is the Lower Freeport seam, is free from irregularities and runs from 3 ft. 8 in. to 5 ft. 6 in. in thickness. Some sulphur and quite a little bone are found in this coal. However, it averages high in heat units and is an exceptionally good fuel for both steam and domestic use, as shown by the following proximate analysis by the U. S. Geological Survey:

Sample	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	B.t.u.
No. 1.....	3.7	37.4	51.2	7.7	3.07	13,220
No. 2.....	...	42.2	57.8	...	3.47	14,910

The new shaft has two hoisting compartments and two compartments for the intake and exhaust of the air. The mine at the present time is ventilated through No. 1 mine by means of an engine-driven, 4 x 10-ft. Jeffrey fan (located at No. 1 mine) and assisted by a small booster fan. Double and triple entry systems are used.

The shaft is 22 ft. 6 in. by 11 ft. 6 in., and the lining is of solid concrete construction, the walls having a minimum thickness of 22 in. and terminating in an arch on each side of the shaft bottom. Wooden guides, 8 x 9 in., are used; and the guides are fastened to wooden buntings the ends of which are concreted solidly in the walls of the shaft.

The bottom is so arranged that coal is caged from one side of the shaft by automatic cagers, which are supplied by trip feeders having a speed of 30 ft. per minute. The feeders are driven by a 7½-hp. direct-current motor. Six mining machines of the Goodman shortwall type are used to undercut the coal. Coal is



GENERAL VIEW OF AMSTERDAM MINE NO. 1

gathered mainly from the working places by two 6-ton Goodman electric locomotives, but a few mules are also used. The wooden mine cars, having a track gage of 44 in., are equipped with Watt wheels and hold approximately 4500 pounds.

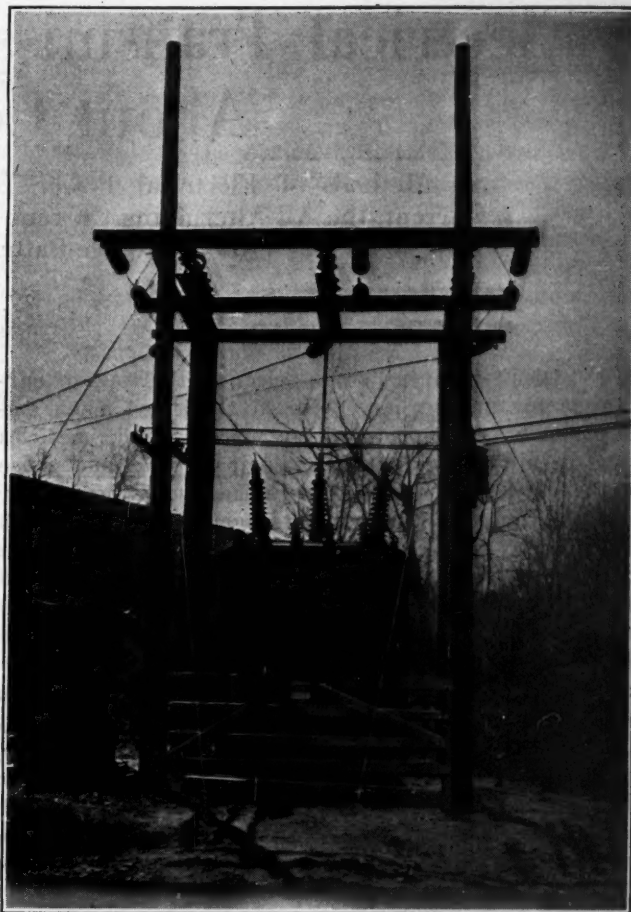
All mine water is handled by a 5½ x 8-in. Deming triplex plunger pump driven by a 45-hp., 250-volt, direct-current motor. The 4-in. discharge line of this pump is run from the coal to the surface through a 6-in. borehole. As a safeguard against excessive seepage, pulsation and deterioration of the pipe, the clearance was filled with concrete.

The prevailing high price of structural steel and the uncertainty of delivery made it necessary to construct a wooden tippie. The plan throughout has been to make a liberal allowance in the size of the material used as a safeguard against maximum strains. Posts rest on concrete piers, and every precaution has been taken at this point to guard against deterioration due to moisture.

Coal is dumped by self-dumping cages (1½-in. steel hoisting rope being used) directly into a 4-ton weigh hopper. From the weigh pan the coal is dropped to an 8-ton hopper. Run-of-mine can be sent to a bin and then to the railroad cars; or if prepared sizes are desired, the coal is fed from the hopper by a 4½ x 9-ft. conveyor to the shaking screens; from here it goes to the picking band and then to the loading boom. Refuse discarded from the picking band is carried to the dirt bin by an 18-in. conveyor. To drive the main conveyor, shaking screens, picking band and loading boom, and the 18-in. dirt conveyor, two 25-hp. and one 7½-hp. 220-volt, alternating-current induction motors are used respectively. The tippie is of the common four-track type, the railroad cars being placed by gravity. Screening and loading are so arranged that the coal can be loaded as follows: No. 1 track, slack or run-of-mine; No. 2 track, nut, or nut and slack; No. 3 track, egg, egg and nut, or egg, nut and slack; No. 4 track, 6-in. 1½-in., or run-of-mine.

The power house is a brick building 28 x 62 ft. in dimension. Power is furnished by the Central Power Co. at 66,000 volts from a substation at Dillonvale, Ohio. Primarily the power supplied is generated at the famous plant of the Windsor Power Co., Windsor, W. Va. From 66,000 volts the voltage is stepped down to 4000 volts at a small substation located at the mine. This in turn is stepped down by another transformer in the power house to 440 and 220 volts respectively. A 200-kw. synchronous converter furnishes direct current for the mine at 250 volts. The transmission lines into the mine run through 2-in. conduit embedded in the wall of the shaft.

A 6-ft. Lidgerwood hoist is driven by a 300-hp., 230-volt, variable-speed induction motor having a maximum speed of 600 r.p.m. A modern 32 x 65-ft. shop with ample equipment for blacksmith, electric and car repairs is also conveniently located near the shaft. Ample provision was made in a well equipped office building for the storage of small supplies; also a large building was constructed of hollow tile for the storage of feed for the mine stock, for oil and for sand. The present capacity of this mine is 800 tons a day; when sufficient



OUTDOOR TRANSFORMER AND SUBSTATION AT AMSTERDAM MINE NO. 2

territory is developed it is expected the capacity will be about 1200 tons.

Acknowledgment is here made to Amos Jones, superintendent of the Amsterdam mine, for information and data supplied for this article.

Organizing for Mine-Rescue Work

To make rescue work in a mine efficient, there must be coöperation and harmonious relations between all forces, and there must be an organization that will push to quick completion the work of exploring the mine. A satisfactory organization may be outlined as follows: The general manager or superintendent assumes full charge of obtaining all necessary materials and men for the prosecution of the work; the state inspector assumes or accepts authority for the rescue and recovery procedure; the general manager or superintendent and the mine inspector select the foremen of shifts and other foremen who report to them or their representatives at the close of the shift, stating what has been accomplished. The rescue crews should be in charge of a chief of the rescue organization, to whom each crew should report. The chief of the rescue organization should report to the mine inspector in charge of the rescue and recovery operations or to some other official in charge of the underground work. When sufficient men are available the recovery crews should be arranged in 6-hour or 8-hour shifts; that is, they should work for 6 or 8 hours.

Electrical Transmission of Power in and About Coal Mines*

Six Methods of Electrical Power Distribution, Embracing the All-Direct Current, the All-Alternating Current and Four Other Combinations of These Two, With or Without Storage-Battery Haulage, Are Available in the Mine

BY S. W. FARNHAM
Chicago, Illinois

IN SOME instances, when selecting the type of current for underground work, I think too much emphasis has been placed on the machine load. Articles have been written treating principally this one phase of the subject and considering the haulage as secondary. We sometimes hear that the storage battery will, in all probability, sooner or later emerge from its present obscure but valuable work as a gathering element, and expand into main haulage service; or, that a successful alternating-current main-haul locomotive is sure to be developed. Those who advocate the use of alternating current at the mine faces claim that we should decide the question from the standpoint of the machine load; the locomotives should be installed according to any convenient plan, not letting their problems affect the decision as to the general transmission system to be employed. The improvements that are certain to come will cause a change in the haulage system later, they say. A broad review of the conditions hardly justifies such conclusions.

In this age of invention and rapid development, it is, of course, unwise to assert that certain changes and improvements will never be made; but the operator and engineer must deal with existing facts, demonstrated through successful practice. New things must be tried and proved before allowing their possibilities to affect decisions on other equipments or systems.

CHOICE OF POWER DEPENDS ON CONDITIONS

It is not within the province of this paper to express an opinion as to whether the direct-current or the alternating-current mining machine is the better; or whether the storage-battery type or reel-and-trolley type locomotive should be used for gathering. Each type of equipment has its champions; each has its advantages and disadvantages. Some conditions unquestionably favor one type, and other conditions another.

An alternating-current locomotive has been tried in Illinois mining work, and discarded. No one has had the temerity to try one since. In railroad practice, one large manufacturer advocates the direct current; another, the alternating current. But the control apparatus on the alternating-current locomotives, using single-phase current, looks too complicated and takes up too much space to be used in mine work.

Street cars have tried the alternating-current motors, in a few instances, but the practice is practically "dead." It is safe to place the alternating-current mine locomotive in the remote future possibility class.

As to the storage-battery locomotive for main haulage, the heaviest battery locomotive now built has about eight tons of weight on the driving wheels, and is of

moderate speed, with limited radius of action because of battery capacity. Light main haulage, restricted in tonnage and distance, can be served by battery locomotives.

Main-haulage locomotives in Illinois may be said to average 12 or 13 tons in weight, and most of the later purchases are of at least 15 tons. Something radically different must be developed before such sizes of battery locomotives could be used. Furthermore, the present cost of batteries would make such locomotives commercially prohibitive.

The trolley locomotive for main haulage underground is to be with us for a long time; there is no sign of anything else to take its place. It should receive due consideration in the selection of any electric transmission system.

In fully developed Illinois mines, the locomotives on the average may be said to represent approximately one-half the total load on the circuit. Furnishing power to the locomotive may therefore be considered equally as important as furnishing it to machines, aside from the fact that the machine load is at a greater distance from the power source and requires better voltage regulation.

TYPES OF MINE LOADS TO BE CONSIDERED

The following types of mine loads must be considered: Main-haulage locomotives, receiving power from the trolley; gathering locomotives, receiving power from the trolley or from a storage battery, or both; mining machines, operated either by direct or alternating current. In various mines we have to consider combinations of one, two or three of the loads mentioned. As to methods of transmission, we have the following:

All Direct Current.—While 600 volts maximum, medium pressure, is used in some places in the East, we do not have to consider it here, as the Central-Western coal fields use 300-volt maximum, low pressure, direct current.

All Alternating Current.—This is used only where alternating current or gathering locomotives, mining machines, or both, are installed and no trolley locomotive is used.

Combinations of Direct and Alternating Current.—

(a) Alternating-current machines and direct-current main-haulage, with reel-and-trolley gathering locomotives. (b) Direct-current mining machines and locomotives with alternating current used only for transmission into the mines to convenient points, where it is converted into direct current by means of motor-generator sets or by transformers and rotary converters. (c) Similar to (a)—alternating-current mining machines, storage-battery gathering locomotives and

*Abstract of paper read before the Illinois Mining Institute, May 22, 1919.

direct-current trolley main-haulage locomotives. (d) Alternating-current mining machines and storage-battery locomotives—this last combination being practicable only where the locomotive work is light.

In Illinois and Indiana, the great majority of the installations are of the "all-direct-current" type, and the combination of direct and alternating is in use in some of the newer operations, as described in (a) and (c); one of the latest mines in Illinois is being projected with combination (b).

The combinations (a) and (c), while well known in Illinois, are almost unknown in the larger Eastern coal fields—not only in the old installations, but in the new. Where alternating current is used there it is almost exclusively for high-pressure transmission, and the entire current is changed over at suitable substations in the mines for the use both of mining machines and locomotives. The latest mine to be developed in Illinois is being opened with this plan in view.

OBJECTIONS TO ALTERNATING CURRENT UNFORTUNATE

One occasionally hears objections made to the use of alternating current in any form underground. This is most unfortunate. The use of this form of power for high-pressure transmission in modern mines, with large tonnage and long distance of transmission, is essential.

It has been used for a number of years in England and Australia, and is permitted by Government sanction and regulation. Circular No. 23, "Standardization of Electrical Practice in Mines," published in 1910 by the Bureau of Standards at Washington, refers to the use of alternating current underground on pages 13 and 14, and prescribes rules for its safe installation. I quote in part from this bulletin: "A higher pressure than a medium pressure (600 volts) shall not be used for portable motors; nor for any other purpose underground, except for alternating-current transmission; or for application to alternating-current apparatus in which the whole of the high-pressure circuit is stationary. For work underground taking higher pressure than a medium pressure all transformers shall be of the oil-installation type and the motor shall not be of less normal rating than 20 brake-horsepower."

A rule for safety which applies to both direct and alternating apparatus specifies that all metallic coverings or armoring of cables, and frames and bed plates of generators, transformers and motors, and the metallic covering of switches, fuses and circuit breakers, shall be efficiently grounded.

I have observed where grounding as described above has been properly installed originally it has not always been maintained. Where the grounding wires pass through floors or partitions they should be incased or protected by pipe or conduit, since otherwise they are liable to break. In fact, they often do break. The importance of frequent inspection of grounding wires cannot be emphasized too strongly.

Voltages up to 3300 have been used, and there is no apparent reason why 6600 volts could not be employed with confidence underground, when installed according to the proper rules and regulations. The current is carried in three-phase armored or otherwise protected cables, usually placed in trenches. These cables extend from the surface to substations at strategic points near the working faces.

It will be noted that alternating current not above medium pressure may be used underground on portable motors, or on the moving parts of any stationary motor. This limits the pressure to be used on cutting machines to below 600 volts. It does not limit the voltages that can be used for the stationary part of the properly installed circuits in the same mine. There are few alternating-current machines, however, that are above low pressure (300 volts). Current is supplied to them from transformer stations, and the secondary circuits to the machines are either 220 or 250 volts, and the transformers are usually provided with 10 per cent. high taps, so that 275 volts can be supplied to the machine circuit if desired, from the 250-volt transformers, and 240 volts can be supplied from the 230-volt transformers.

Direct current is used for machines and locomotives not only in the old mines, but in a majority of the new operations. Alternating-current mining machines, while installed to a greater extent in the Central Interior field than elsewhere, are comparatively rare in Pennsylvania, West Virginia and eastern Kentucky operations.

Some of the larger mines are so arranged as to have the entire electric load on the day shift. A second group, by using battery gathering locomotives and charging them at night, places part of the load on the night shift, thereby reducing the maximum peak load on the generators, transmission lines and substations, if any. Others place part of the machine load on the night shift and thereby reduce the peak load.

Data have been accumulated of a few of the larger operations in Illinois where the conditions affecting the transmission problem may be said to be fairly similar. In one mine everything is placed on the day shift and planned for maximum production. Shortwall cutting machines, reel-and-trolley gathering locomotives and main-haul trolley locomotives, all of the direct-current type, are used.

The distance from the station switchboard above-ground to the distribution board near the foot of the shaft is 1250 ft. The total capacity of copper conductor used on the outgoing circuit is 3,000,000 circ.mil, and a conductor of equal size is employed for the return. The main haulage track, when well bonded, should have a resistance about equal to that of an 850,000-circ.mil cable.

OUTGOING AND RETURN FEEDER CIRCUITS

The outgoing circuits are of about the same carrying capacity as the return. The roadways go in two directions from the main shaft, with branch entries to the right and left, while panels are turned to the right and left from the latter. This splits the current about in half at the shaft bottom, and the company will probably strengthen both the outgoing and return feeder circuits on the two main entries, later on putting in alternating current for the purpose of transmission of power to motor-generator or rotary converter substations near the faces. At the present time the tonnage has expanded to a point where the voltage drop is such as to make additional feeders desirable.

In order to compare some installations, I have estimated the cost of the circuit material and the installation at different mines, based on present labor and material expense, using the same basis of cost for each operation.

The circuits have been subdivided into groups. The first comprises transmission from the surface station to the distribution point at the bottom of the shaft, trolley transmission from the shaft bottom to the main-haul parting, feeder circuits from the shaft bottom to the main-haul partings, and trolley transmission from partings to faces where gathering trolley locomotives are used. The second group consists of machine circuits or feeders for machines and gathering locomotives.

At the mine under consideration the estimated circuit costs are as follows:

Circuits from power house to shaft bottom.....	\$5,145
Trolley lines, bottom to main haulage.....	15,314
Feeders (trolley and machine to partings).....	10,645
Gathering locomotives, trolley equipment.....	11,290
Inside feeders.....	3,124
Total.....	\$45,518

The average capacity of the mine is about 5000 tons, and the maximum output over 6000. It operates its own electric plant.

The next mine under consideration is one using alternating-current shortwall machines, storage-battery gathering locomotives, and main-haul trolley locomotives, all of the load being on the day shift, except the charging of the gathering locomotives. The distances from the shaft bottom to the faces are much shorter in this mine than in the first one. The tonnage has been up to 4500 and now averages about 3500 tons. The circuit costs are estimated as follows:

Circuits to shaft bottom.....	\$1,630
Trolley wire, track bonding, etc.....	4,323
Alternating-current feeders, including transformer substation.....	9,675
Secondary circuits, machine lines.....	16,290
Total.....	\$31,918

There are some rather interesting points brought out by this detail. In the alternating-current installation the cost of the secondary circuits, feeding power to the mining machines only, including the transformers, is a little greater than the cost of the trolley circuit inside the partings and their feeders in the other mine. In other words, taking these two mines as a basis of comparison, there is no saving effected by using battery locomotives for gathering and alternating-current machines, so far as the cost of the circuits from substation locations or inside partings to the faces is concerned.

In making this statement it must also be taken into consideration that the tonnage of the direct-current mine is considerably greater than that of the alternating-current operation with which it is compared, and the distance of transmission is longer. It will also be noted that as the mine stands today the cost of feeders from the shaft bottom to the substation is about the same. The point where alternating current shows less first cost is in the transmission of power from the surface to the shaft bottom, and in the future the alternating-current feeders will simply have to be lengthened; whereas, in the direct-current installation, they will not only have to be lengthened but increased in capacity.

This analysis would indicate that in the largest operations the use of alternating current for purposes of transmission becomes essential by the time the mine reaches its full capacity, and the distance of trans-

mission reaches, say, a mile and a half. This, of course, would vary with the conditions in different operations. This statement is made without reference to the type of equipment used from substations to the inside.

The advocates of storage-battery gathering, as compared to reel-and-trolley, claim the advantage of reducing the size of the station required for furnishing power on account of the fact that their load comes on the night shift. This results in maintaining better voltage for the balance of the equipment or using lighter circuits for feeders, etc. They, of course, claim other advantages, which have no direct bearing on the transmission problem.

Those in favor of the reel-and-trolley haulage claim that the addition of the locomotive load to the circuits does not increase the necessary station and wiring capacity in direct proportion, because, with the greater number of operating units, the load factor can be reduced. They also claim operating advantages in simplicity and ample capacity, as well as a simplification of maintenance on the inside circuits, because the same wiring can be used for both machines and locomotives.

Before leaving the subject of comparison between mine circuit costs, analysis of a circuit of a mine using direct-current breast machines and main-haul locomotives, but no gathering locomotives, will be interesting:

Circuits from power house to shaft bottom.....	\$2,746
Trolley lines, bottom to main-haul parting.....	13,514
Feeder lines.....	10,310
Inside feeders, machine lines.....	8,774
Total.....	\$35,444

The output of this mine averages 4200 tons, with a maximum a little in excess of 4500.

In this mine the feeder lines for trolley and machines are connected by switches on the inside of the mine, so that in event of a short-circuit occurring on one system, the switch can be thrown out and the other system continued without delay.

Roof conditions make it desirable to segregate circuits in many mines, so that a fall of rock or other occurrence disturbing one will not affect the other. At the same time it is desirable to tie the lines together so that a better average voltage can be obtained by reason of the maximum voltage not being on one circuit at the same time that it is on the other, except at rare intervals.

AUTOMATIC RECLOSING CIRCUIT BREAKERS

There are on the market today automatic reclosing circuit breakers, of a type that can be installed in the mines, that will automatically keep the connections between the two circuits open until the short-circuit on one section has been removed. They will then reclose, throwing the two circuits together for cooperative feeding.

One factor that helps the direct-current transmission is bonding of the tracks. Another factor that favors the use of direct current to a greater distance from the mine entrance in the Western Interior coal fields than elsewhere is that practically all of the openings are shafts and the workings radiate in all directions from them, splitting up the electric current at the shaft bottom and reducing the amount to be carried to each section. All of the mines of any consequence have electric locomotive haulage, and this requires a sub-

stantial track. I think it is safe to assume that the average weight of rail on main haulage roads in Illinois is at least 40 lb. per yard. This rail must be bonded to offer a suitable return for the trolley locomotive current. A track that is properly bonded for main haulage has under average conditions a carrying capacity for a much greater load than that represented by the mine locomotive. The extra capacity is utilized for the return for direct-current machines, as well as the motors.

In order to secure a thorough knowledge of the mine circuits, it is recommended that the well-known short-circuit method of testing be used. By this means the total resistance of the entire circuit from the power house to the various points in the mine can be determined accurately, and these tests should be made frequently in order to detect any change in the resistance of the circuits. By calculating the resistance of the copper conductor and subtracting it from the total resistance obtained by test, the result of the track return resistance can be measured much more quickly than by testing individual bonds. When the ohmic resistance of the circuit increases beyond a certain point, that circuit should be gone over with a bond tester.

A log may well be kept of these tests and comparisons made with calculations as to what the resistance should be. With this information the operator can determine where to strengthen his circuits.

From a review of the operating conditions, and the sizes of circuits used in various mines, we find that the feeder distribution from partings to machines, where direct current is used, has about standardized on the 2/0 size of wire, with occasional strengthening with 4/0 feeders where the distance becomes unusually long. In alternating-current machine practice the 2/0 size of wire (three wires to a circuit) seems to have become standard near the faces, but three 4/0 lines are frequently used on at least part of the longer circuits.

I think it is safe to assume that the amount of wire in the secondary circuits for alternating machines is at least 50 per cent. greater than the amount used for direct-current machines on the circuits in the corresponding parts of the mine. Another factor that has to be considered is that the distance at which the current can be conveyed over these inner circuits to the direct-current machines is greater than it can be conveyed conveniently by the low voltage used on the alternating-current machines. To the 50 per cent. additional cost of the secondary circuit must be added the cost of underground transformers.

Where power is furnished to the mine by an outside company, it has to be converted to direct current for the locomotives, and also for mining machines, if the direct-current type is used. This conversion, because the substation operates at partial load most of the time, may be said to result in at least a 25 per cent. loss in power. This factor is an attractive one to the advocates of the alternating-current machines.

Some operators claim that the extra wear and tear on alternating-current machine cables as compared with the direct-current cables, added to the inconvenience in moving the alternating-current machine along entries, as compared with the direct-current machines, coupled with the advantageous characteristics of the direct-current motor as compared with the alternating-current motor, more than offsets the saving in power by the use of the alternating current.

There is no question but that from the standpoint of mine circuits, considered solely by itself, the simplest proposition is to use direct current up to a point where the load and distance make it impracticable. Where it is known in advance that the operation will ultimately exceed the limits of direct-current transmission, a converter or motor-generator substation can be installed when convenient, with high-tension alternating current going to it, and low-pressure direct current leading to the direct-current mining machines and locomotives underground. This gives the simple direct current near the working faces.

With a better understanding of bond maintenance, and with the installation of better tracks that follow the use of large cars, it is easier to maintain the direct-current circuits than has been the case before.

This paper has purposely dealt with types of transmission, leaving it to a discussion by the advocates of various systems as to which type should be employed under conditions prevailing in the Illinois field.

Legal Department

PERSONAL INJURY AWARD NOT EXCESSIVE—\$11,686 was not an excessive award for injury to a mine employee resulting in loss of a leg by amputation. (*Pennsylvania Supreme Court, Ford, vs. Philadelphia & Reading Coal and Iron Co.*, 105 Atlantic Reporter, 885.)

INJURY RISK NOT ASSUMED BY STEVEDORE—Conceding that a stevedore employed in loading coal into buckets in the hold of a vessel assumed the ordinary risk from the occasional falling of a lump of coal, he did not assume the risk of spilling of a large quantity into the hold through negligence of the hatch tender. (*United States Circuit Court of Appeals, Ninth Circuit; Garcia vs. Western Fuel Co.*, 255 Federal Reporter, 817.)

SCOPE OF RIGHTS UNDER COAL DEED—A clause in a deed to coal in place, conferring on the grantee the "free and unrestricted right to remove and carry away, under said described premises, other coal belonging to or that may hereafter belong to" the grantee, gave no right to transport coal from adjacent lands over the surface of the land of the grantor. (*Pennsylvania Supreme Court, Shaulis vs. Quemahoning Creek Coal Co.*, 105 Atlantic Reporter, 826.)

KANSAS MINING LAWS—The Kansas statute, which forbids use of dynamite or other detonating explosives in coal mines, excepting under rules and regulations agreed upon by an employer and his employees and approved by the state mine inspector, is constitutional, and not invalid as delegating legislative power to operators and miners. The act applies to strip-pit coal mines. A shotfirer using dynamite in violation of provisions of the act cannot recover damages for injuries sustained by him in consequence. (*Kansas Supreme Court, Richards vs. Fleming Coal Co.*, 179 Pacific Reporter, 380.)

RIGHTS UNDER COAL DEEDS AND CONTRACTS—Where an owner of land gave an option for the purchase of 167 acres of coal in place, with mining rights, and afterward delivered a deed for only 150 acres, under an oral modification of the agreement, no mining rights could be exercised over the 17 acres not deeded. A deed made in full execution of a contract for the sale of land merges the provisions of the contract, including all prior negotiations and agreements leading up to the execution of the deed. Where a deed to coal in place provides a specific means of access to it for mining purposes, the grantee can claim no other way, howsoever convenient another way may be. (*Pennsylvania Supreme Court, Titus vs. Poland Coal Co.*, 106 Atlantic Reporter, 90.)

Electric Arc Welding in Mines

BY JOHN G. KJELLGREN
Cleveland, Ohio

Coal-mine officials are appreciating more and more the possibilities of electric arc welding as a means of increasing the general efficiency of the mine equipment. Just where the limit of the welding process lies, it is impossible to state at present. New uses are found for it every day. Electric welding has become not only a problem of repairing broken parts, but rather one of prolonging the life of the equipment and, at times, even creating working parts from the scrap heap.

Electric arc welding comprises two methods, one employing the carbon arc and the other the metallic arc. In the carbon arc the work is one electrode and a carbon rod forms the other. The current is drawn between these electrodes and the arc heats up both the carbon rod and the work. When the latter has changed to a liquid state, a metallic filling rod is introduced into the arc. This metallic rod quickly melts and joins with the molten metal in the work.

The metallic arc employs a filling rod of iron or steel as one electrode. The metal is carried by the arc from the rod to the work, which has been preheated by the arc itself just at the spot where it is desired that the metal should be deposited. The carbon arc corresponds in its action to the flame used in gas welding. It is not so convenient in handling as the metallic arc, and is mostly used for cutting, also for welding certain non-ferrous metals. The metallic arc employs a short actual arc, preferably not over $\frac{1}{4}$ in. in length; therefore the heat is more localized and can be concentrated at any desired spot. This makes it possible to weld a piece without preheating and without much internal stress. Be-



FIG. 1. WELD ON A CAST-IRON HOISTING SHEAVE

cause of the fact that the metal is carried by the arc, welding can be done in any position.

Electric welding is especially adapted for the treatment of steel and iron with perfect results. The better grades of cast iron are readily welded by it, but the welding metal will not adhere to the poorer grades that contain much slag or other impurities. It requires a more experienced operator to weld cast iron than steel. The cast iron is usually of more complicated shapes; it therefore necessitates more perfect control of the cur-

rent and more careful setting up. However, this is not a difficult thing to learn, especially if personal instruction of an experienced operator is given at the beginning.

The 300-hp. hoisting sheave shown in Fig. 1 is an example of a weld on cast iron. All the spokes were broken entirely through; they were prepared and welded in position. The photograph was taken before the work was finished. The welding equipment is shown at the left and the welding rod in the holder at the right. The great advantage of arc welding will be appreciated by

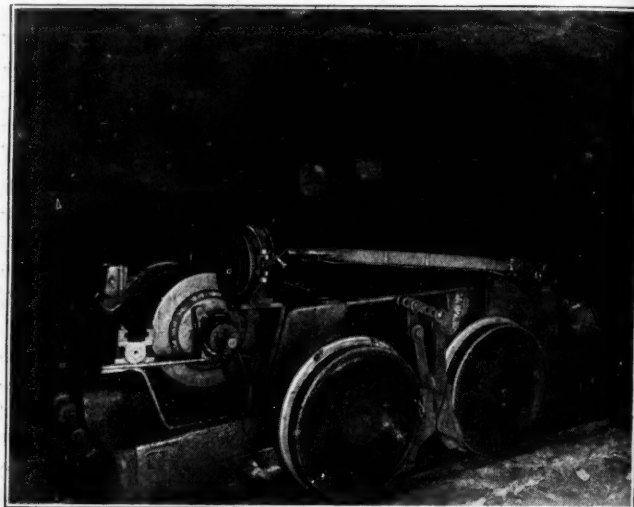


FIG. 2. CAST-IRON LOCOMOTIVE REPAIRED BY WELDING

comparison with the preparation for welding by some other process. In such a case the tension on the rope would have to be relieved, the flange taken off, the rope and rings removed, bearing caps taken off, and the shaft removed from the hubs. After the sheave was separated and placed for preheating, the hub would have to be lined up both with the keyways and the holes in the flange. The whole thing would then be preheated, welded, and slowly cooled. Fig. 2 shows another example of an electric arc weld on cast iron. The locomotive shown was in a collision and the frame broke just above the front wheel. It was taken to the "bottom" and welded on the following day; that afternoon it was again in service. This shows how quickly repairs can be made by electric arc welding.

Great as the field is for mending broken parts, it is small compared with that embracing the prolongation of the life of mine equipment. With some types of equipment, a certain detail of a part has to withstand constant wear; often it cannot be repaired by ordinary methods, and the whole piece must accordingly be thrown away. In such a case the worn place is simply built up by means of the electric arc and is then machined. Thus machine shafts, clutch parts, guides, car axles, wheels, etc., can be worked over and be made as good as new. By using different kinds of welding rods the built-up material can be made soft for machining or of any desired hardness for grinding. Leaking pipes, boilers, condensers, tanks, etc., can also be repaired readily. The extent to which such welding can be used in the mine depends much upon the operator; the more experience he has had the greater will be the use he will make of the equipment.

Rail bonding is often considered a more or less necessary evil, when in reality it is an important factor in

reducing the cost of maintenance and increasing production. With poor bonding there is always a great direct loss of energy, but a greater loss, however, is incurred in the shape of increased motor troubles, both in machines and locomotives. Machinemen are usually the first to notice any improvement in the bonding. Mechanical bonds, as illustrated in the plug and driven pin type, are now being rapidly replaced with electric welded bonds, which give a better and more permanent return at a lower cost. To successfully weld copper to iron requires rather complicated and cumbersome apparatus, and although such equipment has been used on electric railways to apply bonds, it has not been suited for mine work. When this was realized by the manufacturers, a bond provided with an iron casting was brought out. This type of bond could be applied by

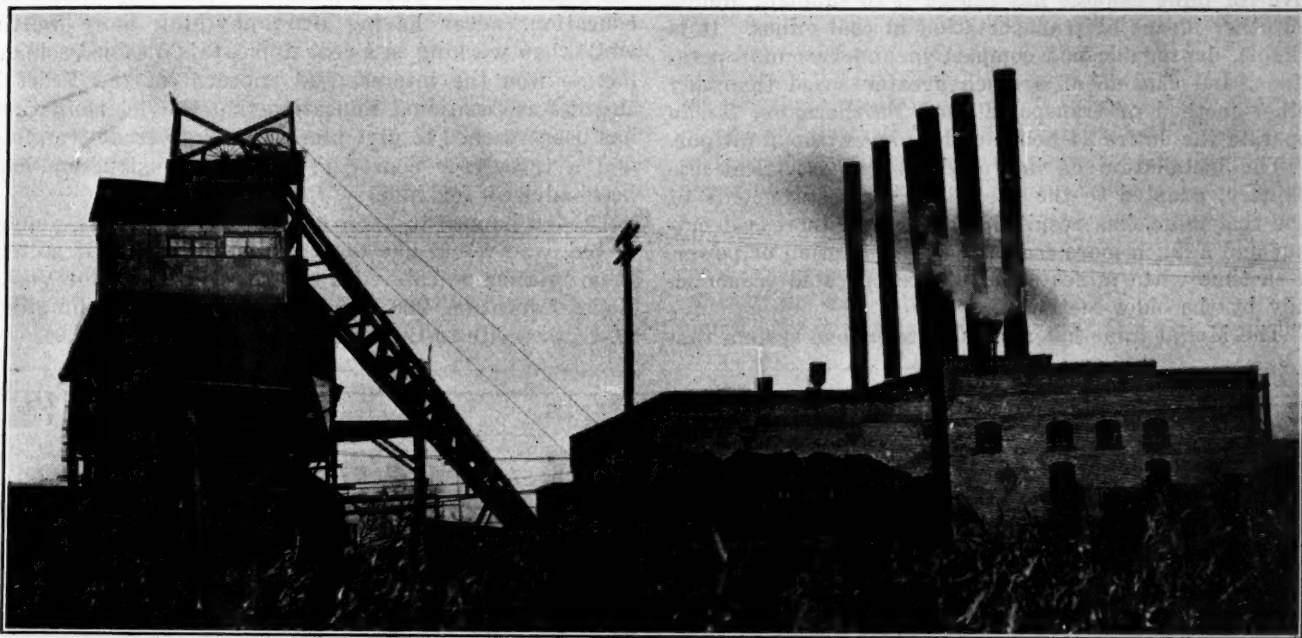
ordinary metallic arc welding. When the bond is welded to the rail it becomes an integral part thereof, and will even stand up under the stress of derailed cars.

A welding equipment that will be of the greatest value to the mine is consequently one that can be used both for general arc welding and for bonding; at the same time it should be so light that it can be taken to any part of the workings. The outfit shown to the left in Fig. 1 fulfills this requirement in an admirable manner, being both inexpensive and light in weight. It was furnished by the Electric Railway Improvement Co., of Cleveland, Ohio. The total weight with leads, etc., is about 50 lb., which may easily be carried by one man. It is always ready for service and will withstand an unusual amount of abuse.

The Moffat Brothers' Mine

Operated for Years by Steam and Mule Power, the Antiquated Methods at This Mine Have Been Replaced, in Part at Least, by Something More Modern—Results Fully Warranted the Cost of Making the Changes

BY W. P. POTTER
Iron Mountain, Michigan

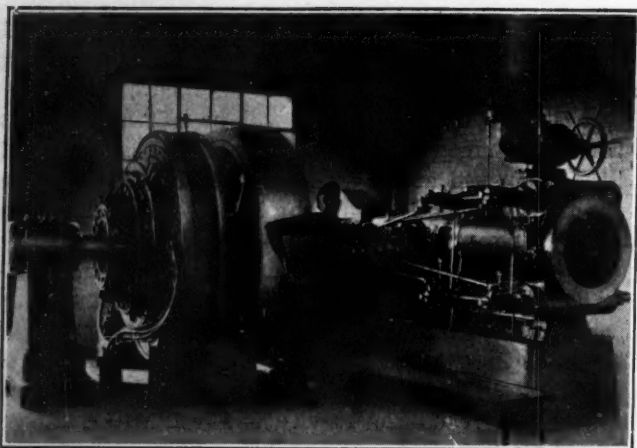


MOFFAT BROTHERS' COAL MINE, TIPPLE AND ENGINE HOUSE

THE Moffat Brothers' coal mine, one of the largest and best equipped coal operations in southern Illinois, is located at Sparta, 54 miles south of East St. Louis, on the Mobile & Ohio R.R. It is owned and operated by the Moffat Brothers and has been in successful operation for years. Only recently, however, has it been electrically equipped, and mules discarded from the main haulage.

This mine employs an average of 250 men and hoists about 1100 tons of coal daily, the greater part of which finds its way to the St. Louis market, where the company's main office is in charge of J. D. Moffat. R. D. Moffat, superintendent of the mine, has charge of the Sparta office.

In equipping this mine with electricity 166 tons of steel rails were laid, or nearly 30,000 ft. of track for the main haulage. Eleven mules were retained to haul the coal from the different rooms or apartments to the main haulage system, where two 10-ton G. E. electric motors complete the delivery to the foot of the shaft. These locomotives are provided with powerful electric arcs which project a strong beam of light along the main haulage system to warn of the locomotive's approach and give the motormen time to stop in case of obstructions. All feeder lines and wiring are installed on porcelain or glass insulators. In the overhead suspension of the power wires the height of the trolley is regulated by extension hangers. The



STEAM-ELECTRIC GENERATOR AT MOFFAT OPERATION

track is of course used as a return circuit. The rails on the main-line haulage system are bonded with a short flexible bond of copper wire securely compressed into holes drilled close to the end of the rails.

The use of steam underground has always been costly as well as dangerous. Furthermore, the naturally increasing distance between the working faces and the delivery points has made necessary a system more efficient than steam, compressed air or mules.

The superiority of the underground electric locomotive for mine haulage has caused it to supplant almost all other means of transportation in coal mines. It is simple, dependable and compact in underground operations, and capable of a much greater speed than any other method of transportation. Furthermore, it can operate the entire 24 hours of the day without fatigue.

The installation of improved modern electrical machinery, adapted to the special power requirements of the coal mine, has resulted in a greatly increased output and a much more economical consumption of power, at a time when mines could not be operated economically by the older methods.

The Moffat mine has a reliable telephone system that

materially lessens the work of the operator in supervising the efforts of the men. The mine is so well ventilated by fans that there is little if any danger from gas, although to a certain extent gas is always present. The ventilating doors, practically automatic in operation, easily swing either way at the touch of the motorman's hand, and no trapper-boys are necessary when a "trip" of coal is on its way to the hoisting shaft.

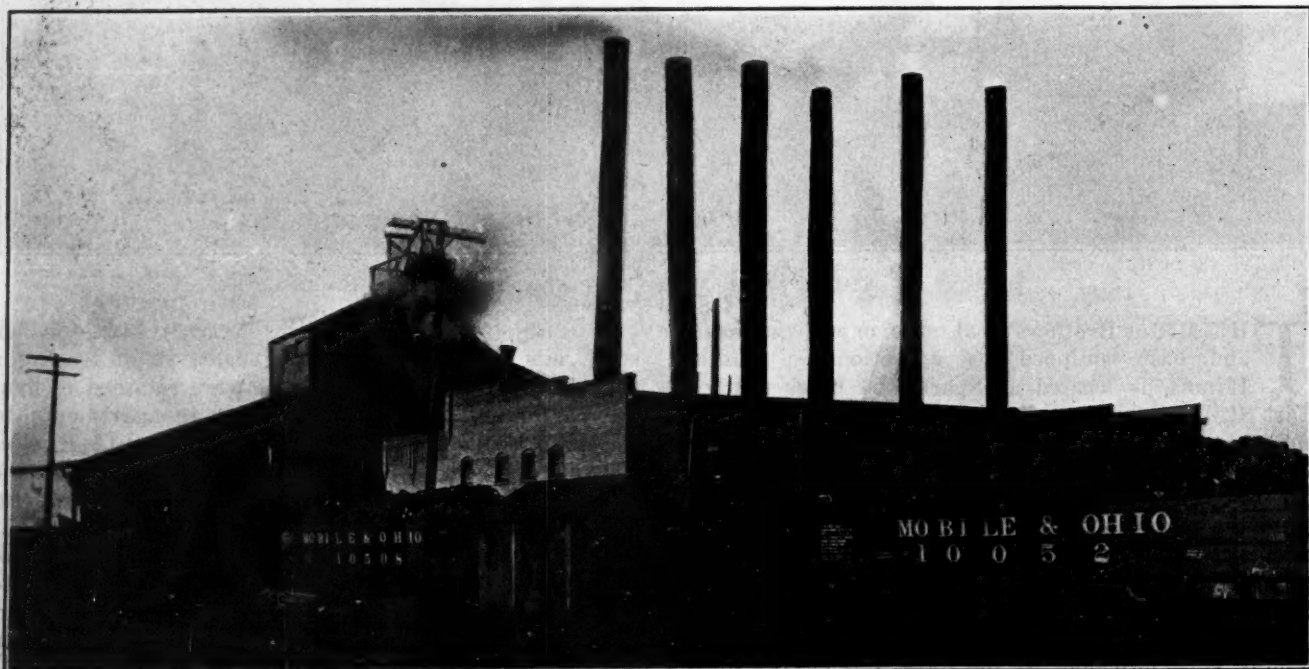
The steam hoist is still used and is operated by a Crawford-McCrimmon engine. The company keeps a large supply of spare parts on hand to prevent shutting down when machinery breaks or gives out.

Eight undercutting shortwall mining machines are used. These have lowered the cost and increased the production of coal. They comprise five Goodman 12AA type and three Sullivan iron-clad type. The coal is loaded by hand. Two new 150-hp. boilers have been added, making six boilers in all. Two steam-driven electric generators are in use, one a 200-kw. generator and the other a 150-kw. machine.

Young Soldier Gets a New Start

Enlisted at fifteen, disabled in the Marne sector at sixteen, now a student at the Carnegie Institute taking architectural drafting, carpentry and mathematics, is the record of one young veteran. With only a meager education, never having done anything more worth while than working in a coal tippie, this disabled soldier has so won the interest and approval of the Federal Board for Vocational Education that the determination has been reached to give him a thorough trade training and a three-year course in building construction has been advised for him.

Do you happen to know of any other veterans, young or old, who would like to make a new start? If so tell them to communicate with the Federal Board for Vocational Education, 200 New Jersey Avenue, Washington, D. C., or write to the board about them yourself.



ANOTHER VIEW OF THE TIPPLE AND ENGINE HOUSE OF THE MOFFAT MINE

The Baltimore Tunnel Disaster

By FRANK H. KNEELAND
Associate Editor, *Coal Age*

THE Baltimore Tunnel, in the eastern outskirts of the City of Wilkes-Barre, Penn., on the morning of June 5 last was the scene of one of the most disastrous as well as one of the most peculiar accidents that ever took place in the history of anthracite mining. The accident was peculiar in that 92 men lost their lives, mostly by suffocation, while within 150 ft. of open air with normal ventilation flowing in the passage in which these men were caught.

The Baltimore Tunnel was opened in 1862, long before electricity was seriously thought of as a motive force for coal mining or anything else. It has been in operation continuously ever since with the result that at present the workings are extensive and far flung, some working faces being well over two miles from the portal. Today, therefore, this tunnel is much like a short narrow neck on a big bottle.

In former years it was the practice for the men to walk to their working places carrying their powder or other explosives with them. About a year ago a number of the men approached the underground mine foreman with a request that a man trip be provided. After hearing the men, the foreman informed them that if they would send the grievance (or pit) committee to him, he would gladly take the man-trip proposition up with its members in the regular manner.

The pit committee accordingly waited upon the foreman and urged the inauguration of the man trip on the ground that the working faces were so remote from the tunnel entrance that the men lost much time in walking to and from their work; also, that many of them were in the habit of laying in wait within the tunnel and "jumping" the first trip of empties going in in the morning. It appeared, therefore, to the members of this committee that it would be much safer and

more satisfactory both to the men and to the management if a man trip was inaugurated.

An agreement was accordingly reached whereby the men were permitted to ride upon the first trip of cars to enter the mine each morning. This permission was, however, subject to three distinct and well understood provisos. These were in substance as follows: (a) No dynamite, blasting caps, detonators, or any form of explosives whatever other than black powder, were to be transported anywhere, in any container or by any means, upon this trip. (b) All powder was to be placed in the rear car of the trip and in this car only; furthermore, this car must contain nothing else. The rear car was to be separated from the rest of the trip or from those cars carrying men by an empty car; that is, one containing neither men, powder nor tools. (c) The pit committee must see to it that each and both of the foregoing provisions were strictly adhered to, responsibility for their enforcement resting jointly upon the members of this committee and upon the mine foreman and his assistants.

By the terms of this agreement, it will be seen that, since the foreman and his assistants seldom traveled on the man trip, the motorman pulling the trip would be responsible for its safe progress, while if anyone aside from the individual men themselves were responsible for their deeds in transit it would be the members of the pit committee. This committee appeared to be, and was believed by the management to be, active, conscientious and reliable. The inspection of the cars and responsibility for seeing that powder was placed only in the rear or powder car was often left entirely to it.

Once, and once only, between the time of the inauguration of the man trip and June 5 last did the mine foreman have any difficulty with any of the men regarding

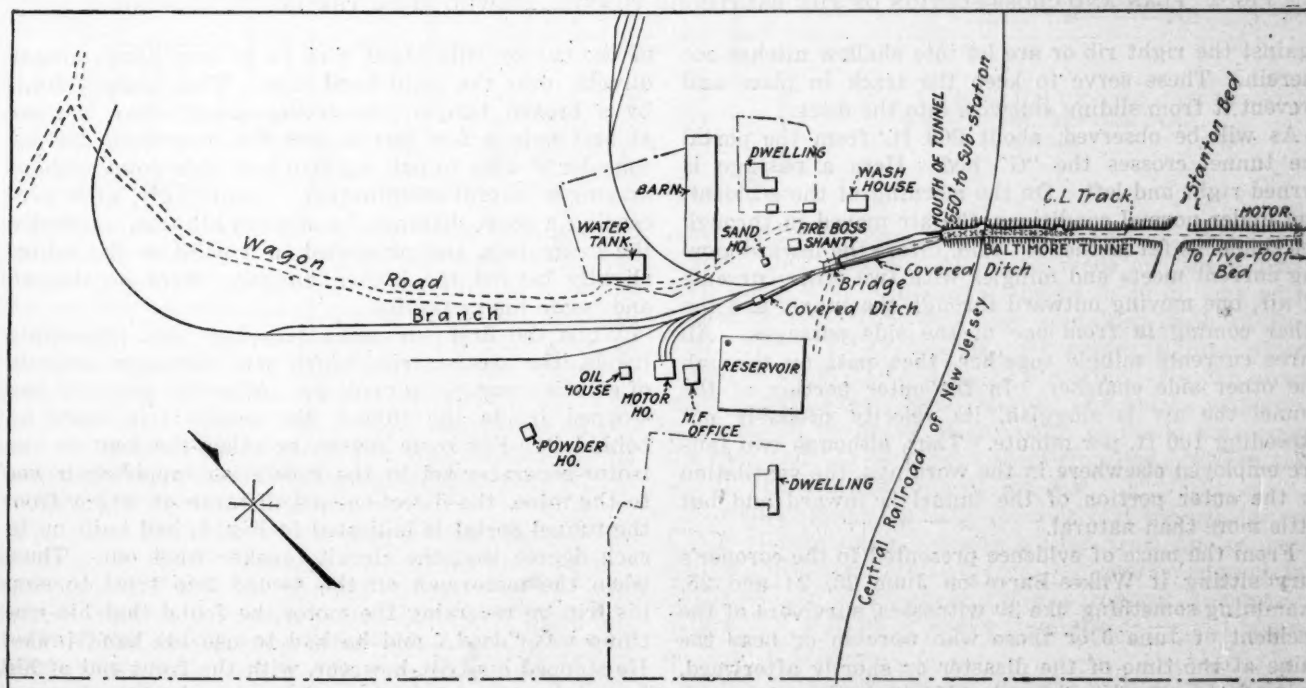


FIG. 1. SHOWING POSITION OF TUNNEL MOUTH AND LOCATION OF VARIOUS BUILDINGS NEARBY

their riding on this trip. Upon this occasion, some time about the middle of March of the present year, two men coming to work late jumped upon the powder car after the trip had started. The foreman yelled to them to get off. One of them complied, while the other refused to budge. The foreman therefore ran after and overtook the trip after it had entered the mine. He reiterated his command that the man get off the trip, and upon his refusal to do so jerked him off with some violence. This man was promptly discharged by his immediate superior.

In the accompanying illustrations, Fig. 1 shows the tunnel mouth and the relative positions of the various buildings nearby. It is in reality a map of the locality round about the drift mouth. Fig. 2 shows the tunnel in greater detail. From the cross-section of the tunnel here shown, which is viewed from the inside looking out, it will be observed that this tunnel is comparatively small in cross-section. The tunnel itself is single-tracked, while close alongside on the right-hand side going in runs a drainage ditch about 3½ ft. wide and from 12 to 15 or possibly in places 18 in. deep. This ditch, which contains from 3 to 5 in. of water strongly impregnated with sulphur, is spanned at intervals of from about 12 to 18 ft. with long track ties that butt

who may have known the exact cause of the accident, if any there were, do not now live. On this point circumstantial evidence only is available.

No one who heard the motorman who drove the locomotive hauling the man trip into the Baltimore Tunnel on the morning of June 5 testify before the coroner's jury could doubt either his veracity, his proficiency, his care, his experience or his courage. On that morning he coupled his locomotive to a string of ten waiting empties. He then backed these cars up somewhat and coupled onto three more cars. He then proceeded to the sand-house near the tunnel portal, where he stopped, sanded up and started for inside. Just within the tunnel he was flagged and stopped by a foreman track-layer who had been working on the night shift and was just then coming out. This man warned him that a trolley hanger at about the "G" vein was loose.

Now, under many circumstances, as everyone knows, one broken trolley hanger in the mine is of no particular consequence whatever. Coal and men may be hauled in and out past it for days, if necessary, with perfect impunity. In this case, however, the motorman deemed it hardly safe to pull a trip of cars loaded with skylarking men and boys past this broken hanger. Under normal conditions the trolley clears the right-hand side

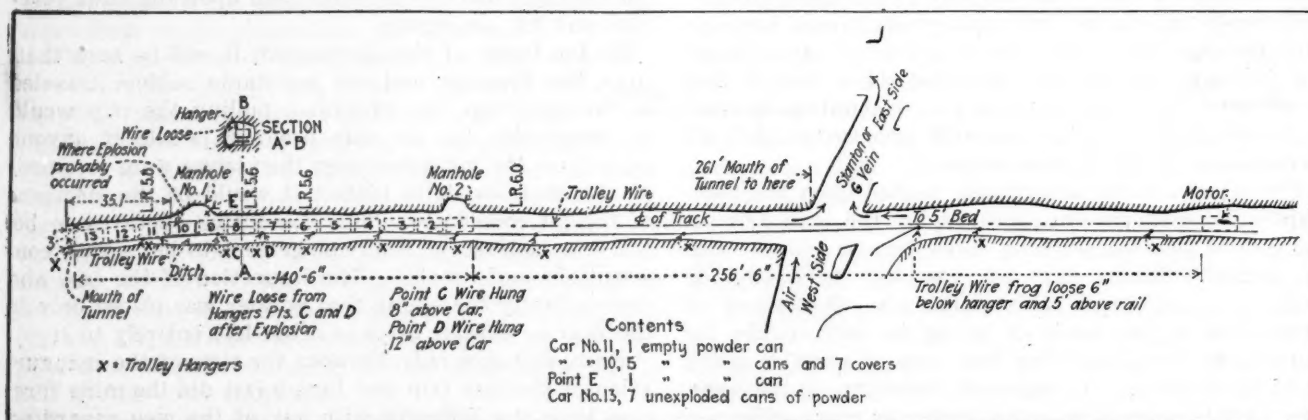


FIG. 2. PLAN AND CROSS-SECTION OF THE BALTIMORE TUNNEL, VIEWED FROM THE INSIDE LOOKING OUT

against the right rib or are let into shallow niches cut therein. These serve to keep the track in place and prevent it from sliding sidewise into the ditch.

As will be observed, about 260 ft. from the portal the tunnel crosses the "G" bed. Here a passage is turned right and left. On the morning of the accident, and under normal conditions, the air moved in through the tunnel as far as the "G" vein. Here the inward-moving current meets and mingles with two other currents of air, one moving outward through the tunnel and the other coming in from one of the side passages. All three currents mingle together, then pass on through the other side chamber. In the outer portion of the tunnel the air is sluggish, its velocity probably not exceeding 100 ft. per minute. Thus, although two fans are employed elsewhere in the workings, the ventilation in the outer portion of the tunnel is inward and but little more than natural.

From the maze of evidence presented to the coroner's jury sitting it Wilkes-Barre on June 23, 24 and 25, examining something like 30 witnesses, survivors of the accident of June 5 or those who were in or near the mine at the time of the disaster or shortly afterward, some facts may be gleaned. Much, however, is still unknown, and will doubtless always remain so. Those

of the car by only about 8 to 12 in. and hangs almost directly over the right-hand side. When sagged down by a broken hanger, the trolley would clear the car at best only a few inches, and the motorman did not consider it wise to pull his trip past this point without making a careful examination. Accordingly, after proceeding a short distance, he stopped his trip, uncoupled the locomotive, and proceeded to a point in the tunnel slightly beyond the broken hanger. Here he stopped and began his inspection.

While the first (or man) trip had been proceeding inside, the second trip, which was composed entirely of empties, was being made up. After the man trip had stopped inside the tunnel, the second trip came up behind it. For some reason or other the load on the motor-generator set in the substation supplying power to the mine, the direction and distance of which from the tunnel portal is indicated in Fig. 1, had built up to such degree that the circuit breaker went out. Thus, when the motorman on the second trip tried to stop his trip by reversing the motor, he found that his machine was "dead," and he had to use his hand brake. He stopped his trip, however, with the front end of his locomotive about 5 ft. from the rear end of the last car of the man trip.

It was at this juncture, with the man trip just within and the second trip just without the tunnel, and the trolley wire over both trips dead, that the ignition of seven cans of powder in the tenth car of the man trip from the locomotive took place. What followed this ignition was not an explosion in any sense of the word. All the evidence presented on this subject, as well as the condition of the cars, powder cans and tunnel, would go to show that what took place was practically a flare-up or series of gigantic fire fountains similar to those used as fireworks on the Fourth of July. While the powder in burning created a considerable blast of air sufficient to project smoke out of the tunnel portal against the existing air current, no detonation of any great audibility was produced.

Up to this point, the testimony and depositions of all witnesses were strongly concurrent. One survivor stated that he heard three or four distinct detonations

found in the ditch on the right-hand side of the trip, it is not believed that these men drowned, but that they died either from burns or from suffocation, or both.

Just exactly what caused the accident no man will probably ever know. Here, circumstantial evidence is stronger than the verbal evidence presented before the coroner's jury. In the tenth car of the trip from the front, there was found after all bodies had been removed five empty powder cans and seven can covers, five dinner pails, two or three teapot oil lamps, one squib box and one tobacco pipe. The interior of this car was badly scorched. In the eleventh car there were found, in addition to dinner pails and oil lamps, one powder can, the contents of which had ignited and burned. In the manhole or refuse space, opposite cars Nos. 9 and 10, was also found one powder can.

None of these cans was blown to pieces or showed signs of excessive internal stress. One was split for a

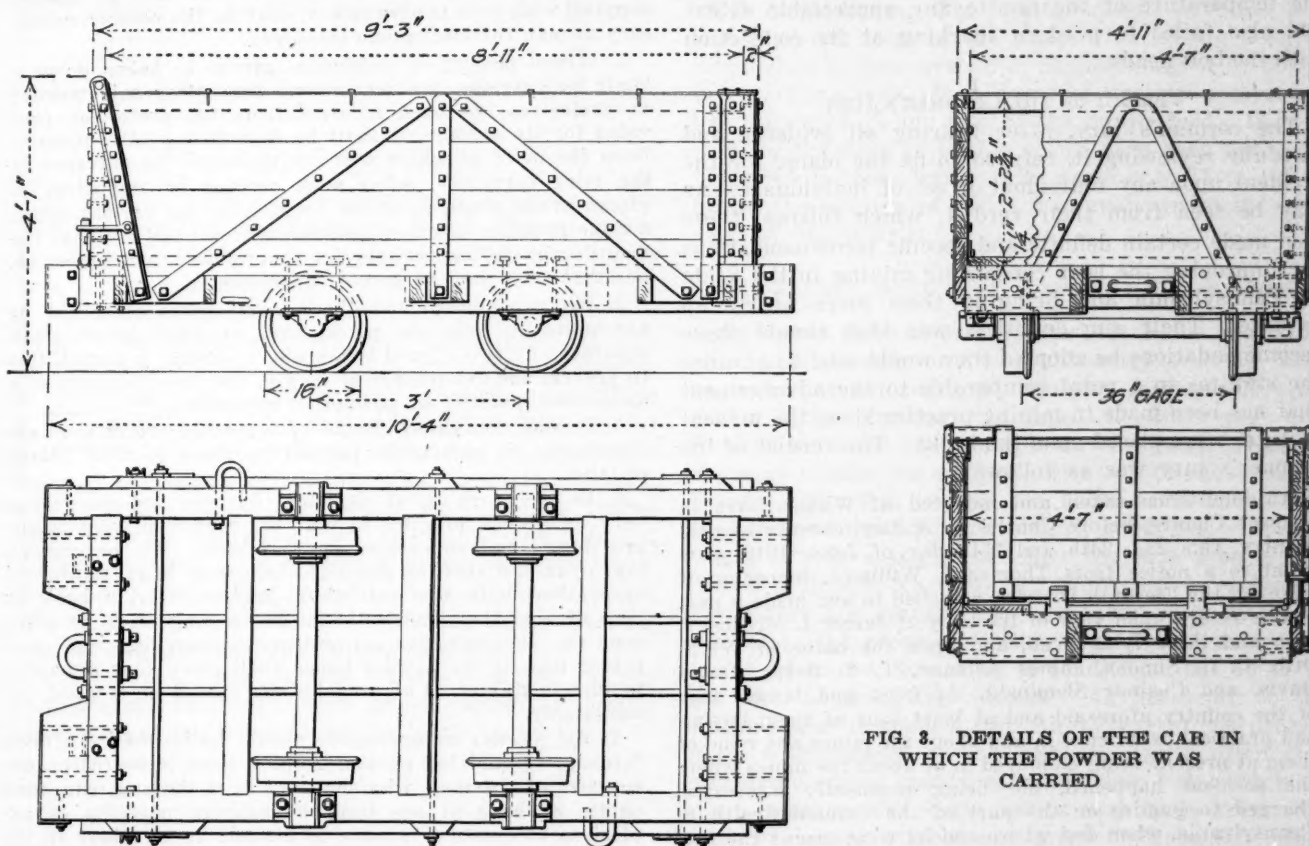


FIG. 3. DETAILS OF THE CAR IN WHICH THE POWDER WAS CARRIED

or puffs. Others noticed only one. One man insisted that he saw "electricity falling in balls from the trolley wire into one of the cars." Since this man barely escaped with his life, and is not yet out of the hospital, it is possible that his recollections of his experience on the morning of June 5 may be somewhat confused. Several of the witnesses stated that some of the men had their lamps lighted and in their caps while on the trip. While none admitted that he was smoking at the time, many were free to acknowledge that smoking on the man trip was not uncommon.

The clearance between the side of the car and the left-hand rib (facing inward) varies from 26 to 30 in.; that from the edge of the car to the roof or roof timbers from 21 in. upward, the roof being quite uneven. Those who attempted to rescue survivors and carry out the dead stated that they found men piled in places five deep between the left-hand side of the trip and the left-hand rib. While one or two bodies were

short distance from the end and several were badly dented and dinged. All were made of sheet iron, were about 6 in. in diameter and 24 to 26 in. long with slip-on covers. They originally contained 25 lb. of Du-Pont FF or FFF black powder made up into paper sausages about 1½ to 2 in. in diameter. No can, even upon minute examination, showed any marks whatever of fusing of the metal at any point as would have been the case had the cans been short-circuited between the trolley and some portion of the car.

It would appear normally possible that the powder on a trip of cars might become ignited from one of two sources: either by ignition from the electric current in some manner or other or through coming in contact with either a flame or spark from one of the oil lamps or from a pipe.

It was established at the inquest with a fair degree of certainty that no current was flowing in the trolley wire at the time of the accident. However, in order

that there might be no doubt whatever on the subject of the powder's ignition, tests were made by disinterested mine inspectors. These tests failed utterly to ignite powder. The theory that return current sufficient to ignite powder might be shunted across a bad rail joint when this point was spanned by the wheels of the car, such a current passing upward through the wheel, through the journal box, through the bolts to the bottom of the car, thence through a powder can to the boxing bolt of the other wheel, and thence back to the rail, seems to be entirely erroneous. Tests on empty cans placed across bolt heads in the bottom of the car (a detail of which is shown in Fig. 3) that had been carefully cleaned for the purpose with the car spanning the worst joint that could be found at the scene of the accident and the trolley wire taken down and laid against the rails some distance inside the point where the car was located failed to increase the temperature of the can to any appreciable extent and also failed to produce sparking at its connection with the bolt heads.

VERDICT OF THE CORONER'S JURY

The coroner's jury, after hearing all evidence and carefully reviewing it, refused to fix the blame for the accident upon any individual or set of individuals. As may be seen from their verdict, which follows, these men made certain definite and specific recommendations for improving the laws concerning mining in the State of Pennsylvania and bringing them more nearly up to date. Their aim doubtless was that should these recommendations be adopted they would tend to advance the statutes to a point comparable to the advancement that has been made in mining practice since the present statutes were placed upon the books. The verdict of the coroner's jury was as follows:

An inquisition taken and indented at Wilkes-Barre in Luzerne County, before Charles L. Ashley, coroner of said country, this 23d, 24th and 25th day of June, 1919, pursuant to a notice from Thomas J. Williams, inspector of mines of the Eleventh District, attached to and made a part of this return upon view of the body of James J. McClosky, then and there lying dead, and upon the oaths of W. F. Otto, C. C. Simons, James Ashman, T. F. Barry, David Davis, and Casimir Sieminski, six good and lawful men of the country aforesaid and at least four of them having had practical experience in and about the mines and none of them at present being employed in or about the mines where the accident happened, nor being personally interested, charged to inquire on the part of the Commonwealth of Pennsylvania, when and where and by what means the said James J. McClosky came to his death, and upon their respective oaths do say that it appears from the view of the body and from the evidence produced before them, that said James J. McClosky came to his death on the fifth day of June A. D., 1919, at Wilkes-Barre, about 6:40 o'clock a.m., in the Baltimore Tunnel No. 5 of the Hudson Coal Co., as a result of being burned or suffocated from the effects of an explosion of blasting powder which was being carried in the same mine car with workmen, and after a careful inspection of the scene of the accident and examination of all witnesses who seemed to have any knowledge of the facts, it is decided that the powder became ignited in a manner unknown to the jury.

The jury has heard all the witnesses that survived the accident and some of them state they saw lighted lamps on the trip of cars. We also heard the testimony of the results of the tests made by the mine inspectors and electrical experts who show that it was impossible to reproduce the explosion by bringing a keg of powder in contact with the wire under varying conditions, such as prevailed ordinarily in the mines. The testimony shows that the disaster occurred so quickly that the eye could not possibly

detect the cause of the explosion. The tunnel itself is low and the wire must be a few inches lower than the roof of the tunnel. The phrase "The wire is hot," is a typical reference heard around the mines to warn men not to touch the wire.

In view of the testimony given by the survivors it is impossible to determine the exact manner in which the disaster occurred. As the witnesses were practically all in total darkness, much of the evidence is a matter of conjecture which makes it impossible to fix the direct cause of the explosion.

We, therefore, do recommend (1) that in order to minimize dangers from blasting powders and explosives carried in the workings of the mines, all powder or explosives shall be transported in separate and distinct trains; that in no case shall it be permitted that men ride in the same cars or in the same train with said powder or explosives.

2. Where electric motive power is used, the powder should be encased in containers of non-conducting and non-combustible material, and that the only persons permitted to accompany said powder or explosives on cars or trains, supplied with such motive power, shall be the persons necessary to man the mechanism employed.

3. Where powder or explosives are to be taken down a shaft by carriage, we recommend that after said powder or explosives has been removed from the protection provided for its storage, it shall be deposited a safe distance from the point at which men are gathered for entrance to the mine carriage. After such powder or explosives is placed at the shaft, or at the entrance to the various veins, a mine foreman or other qualified person shall see that the men do not call collectively for their powder or explosives, but that each shall be served separately.

4. We recommend that the miners' boxes shall not be assembled in any one place; that at least 50 ft. shall separate any two of said boxes where powder is stored, this to prevent the assemblage of men in the direct vicinity of a dangerous quantity of powder or explosives.

5. Powder containers should be inspected before they are distributed to men to be carried by them to their places of labor.

6. In the carrying of dynamite by men, we discover a very dangerous practice in that the high explosive is put into boxes and so carried by said men. We recommend that dynamite shall be deposited in canvas bags, reinforced by leather, with two catches to fasten cover, a hook or ring to hold the miner's ticket, and a long strap to place over the shoulder, for convenience in carrying. A competent man at the powder house shall place such dynamite in such container. Carrying by box should be stopped immediately.

7. All powder or explosives should be issued by a mine foreman or qualified person, keeping himself posted on the supplies of the men, who shall see to it that no man shall obtain or have at one time, a sufficient quantity of explosives to create a menace to himself or to others in the same or nearby working places, nor shall he issue powder to anyone but a qualified miner.

8. Mining laws of the State of Pennsylvania we do find are rendered obsolete by the progress in mining methods and the failure of properly constituted legislative forces to enact safeguards timed to the developments as they occur. We recommend to Governor William C. Sproul that he authorize the chief of the state department of mines to proceed at once in appointment of experts who will revise the mining laws and regulations, particularly as to such new equipment as has been introduced. Electricity as a factor in mining is wholly ignored by such laws as exist. We ask immediate action for amelioration of these omissions.

A committee of electrical engineers, mining engineers, and practical mining men should be appointed to confer at once with the state department of mines and to draft all such additional regulations as will fit the present conditions of mining and meet the problems that miners of this day must face. Continual reference to mining practice and comparative attention to the laws governing the industry should be the rule of caution from this time forward.

The Texas Lignite Industry

BY BRUCE GENTRY

State Inspector of Mines, Rockdale, Tex.

The recent appropriation by the United States Government of \$100,000 for the establishment of a lignite experimental demonstration plant will doubtless create an interest in the minds of many in regard to this fuel. It is proposed to locate the experimental plant in Texas or North Dakota, as these states contain the largest deposits of lignite. It is probable that the plant will be located in some one of the larger cities near the mines.

The principal lignite deposits distributed throughout the United States have been estimated to be approximately as follows:

	Square Miles
Alabama.....	6,000
Arkansas.....	5,900
Kentucky.....	500
Louisiana.....	8,800
Mississippi.....	3,000
Montana.....	7,000
North Dakota.....	31,000
South Dakota.....	4,000
Tennessee.....	1,000
Texas.....	50,000
Total.....	117,200

In addition to the lignite areas given, Alaska contains vast deposits, while adjacent to North Dakota across the Canadian border is a large area underlain with this fuel, in the Saskatchewan province.

There are a great variety of lignites, some of which range from carbonized wood to a semi-bituminous coal. In appearance and weight lignite is somewhat similar to bituminous coal. As they come from the mines there is little difference in the size and shape of the lumps of these two fuels, the principal difference in appearance being that the lignite lacks the gloss or luster common to bituminous coals. Lignite has been termed "brown coal," but as a matter of fact the color of the different varieties ranges from a reddish brown to a jet black. On account of the high moisture content, lignite slacks or breaks into small pieces upon being exposed to the weather for any considerable length of time.

The average Texas lignite weighs about 83 lb. per cu.ft. Texas has almost every known variety of lignite, the best of which shows about the following analysis:

	Per Cent.
Moisture.....	31
Volatile combustible matter.....	32
Fixed carbon.....	29
Ash.....	8
Sulphur.....	1
B.t.u. per lb. of fuel.....	8,000

The Texas lignite fields, which constitute almost one-half of the known lignite area of the United States, are estimated to have originally contained approximately 30,000,000,000 tons; the total tonnage mined to date is probably 18,000,000 tons. The average annual output for the past two or three years has been about 1,500,000 tons. The lignite-bearing formations of Texas comprise a belt with a length of over 600 miles by a width of 50 miles or more. This belt begins near the Red River in the northeastern corner of the state and extends entirely across in a southwesterly direction to the Rio Grande or Mexican border. This belt is parallel to the Gulf coast line, lying from 100 to 150 miles inland. Geologically these deposits belong to the Eocene series of the Tertiary period.

The principal mining operations are at present carried on near the following towns: Rockdale, Milam

County; Bastrop, Bastrop County; Calvert, Robertson County; Jewett, Leon County; Crockett, Houston County; Malakoff, Henderson County; Alba, Wood County; and Como, Hopkins County. Thirty-eight lignite mines were in operation in Texas at the beginning of the year 1919. Most of these operations are shaft mines; these mines are worked on the room-and-pillar plan. No strip-pit mines have been operated in the lignite fields to date.

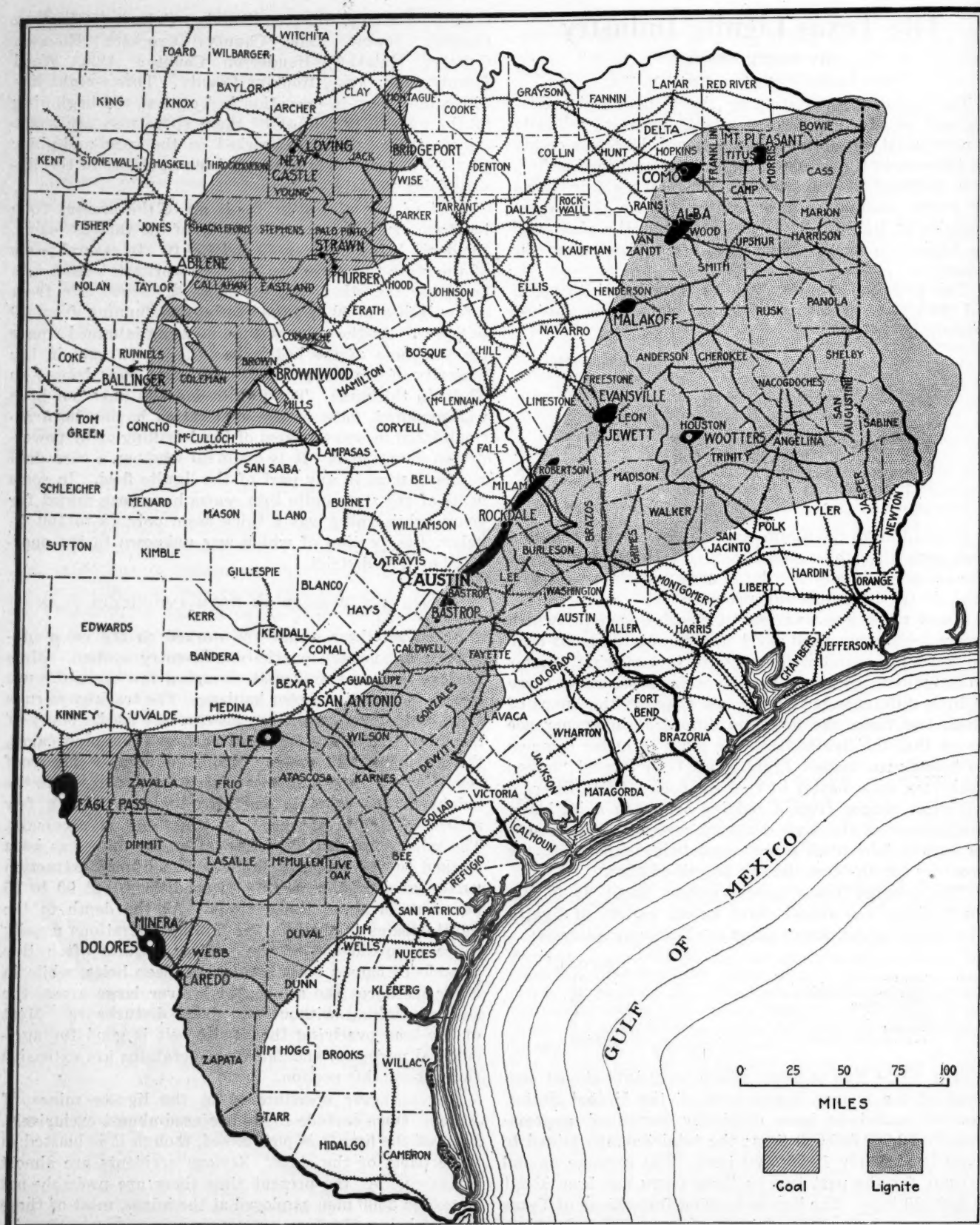
Most of the mining in Texas up to the present time has been along or near the outcrop of the various seams, the depth being between 40 and 150 ft. In several parts of the state there are two or more workable seams, one overlying the other. In thickness the seams are from a few inches to 20 ft.; the overburden running from 20 to 800 ft. At the present time no seam is mined where the thickness of the bed is less than 5 ft., and in the majority of the mines the seam worked runs from 7 to 12 ft. in thickness. The lignite deposits have not been well explored, most of the exploration having been accomplished by some system of hand-drilling or by power-driven churn drill. It is doubtful whether a core drill has been used in any part of the lignite field. In some parts of the state quite thin seams have been mined for years, while there was a thick seam only 75 to 100 ft. below, the location of which was unknown to the operators of that district.

MINES ARE WORKED ON ROOM-AND-PILLAR PLAN

As stated these mines are worked on the room-and-pillar plan, usually on the double-entry system. Mule haulage is almost universal, though a few operators use electric or gasoline-motor haulage. The track gage runs from 30 to 36 in., while ton pit-cars are used. Many of the mine tipples are equipped with self-dumping cages, though many still employ the hand dump. The roof conditions of these mines are fairly good, and where the height of the seam is sufficient to leave even a few inches of lignite overhead no timbering is necessary. The pillars are usually drawn after the mine has been worked to the property limits. The lignite extraction varies, of course, according to conditions, but 50 to 75 per cent. is about the average. As the depth to the lignite seams is shallow, the mining operations usually cause a subsidence of the surface. Quite often this subsidence causes open breaks and deep holes, while in other instances the settlement is over large areas, the surface sinking without any great disturbance. Most of the land overlying the lignite belt is good for agricultural purposes, and farming operations are extensive throughout this section.

Gas is never encountered in the lignite mines of Texas. Open carbide lights are used almost exclusively. Most of the lignite is pick-mined, though it is blasted in some parts of the state. Serious accidents are almost unknown. At the present time there are probably not to exceed 3500 men employed at the mines, most of these miners being Mexicans.

The fluctuating market and competition with crude oil has tended to hamper the full development of the lignite industry. Crude oil is no longer the keen competitor of a few years ago, and lignite is becoming better known, its use is increasing, and the market is improving. The development of the lignite industry will doubtless be similar to that of the oil industry, and will only be complete when the lignite, like the oil, is passed through processes of refining and the valuable



MAP SHOWING LOCATION OF LIGNITE AND BITUMINOUS COAL AREAS IN TEXAS

byproducts are recovered. The byproducts of the lignite, like the byproducts of the oil, will be greater in value than the original fuel. The lignites of Europe, which are similar to ours, have for years been used to produce more concentrated fuels and made to yield their byproducts.

Texas lignites have been used quite successfully in

making producer gas. As compared with bituminous coal the value of this lignite for producer gas, for use in gas engines, is practically in direct ratio to the B.t.u.'s per pound of the respective fuels. The extra weight of lignite required to develop a given power does not necessitate a proportionately larger producer than required for bituminous coal, and in a suitable type of producer

Texas lignite can be utilized as conveniently and efficiently in proportion to its actual thermal value as any fuel.¹ It would seem that Texas offers an attractive field for the location of large central power plants. In these plants the lignite could be converted into gas. This gas could be used in internal combustion engines, and so converted into electrical energy. This electricity could be distributed to the surrounding cities and territory over transmission lines. Surplus gas could also be sold to the nearby cities. In such plants the byproducts such as tars, oils, etc., could be recovered while the residue could be converted into briquets, furnishing a fuel the equal of if not superior to anthracite coal.

At the present time practically all of the lignite mined is used under boilers in its raw state. Near the mines lignite is used quite successfully for domestic purposes. In the raw state it is a satisfactory fuel. But the perfection of a method of extracting the byproducts and the briquetting of the carbonized lignite into a more concentrated fuel would mean a better fuel supply to Texas and the surrounding states; therefore the people are much interested in the plant that will be erected by the Government. There can be no doubt that the successful termination of the experiment will see many similar plants erected by private capital.

First Reinforced-Concrete Railroad Car

The accompanying illustration shows the first reinforced-concrete railroad car built in this country. It was constructed under the supervision of the U. S. Railroad Administration and was turned over to the Illinois Central R.R. on Mar. 17 last. Since then the car has been subjected to the severe usage entailed by railroad freight service. As the object in view was to test the

car thoroughly, it was not spared in the least but was subjected to treatment rather more severe than that given the ordinary freight car.

In spite of its rough handling, the car passed successfully through all tests and was recently turned over to the Pennsylvania R.R. for service upon its lines. Immediately following the transfer the car was sent from Chicago to Loraine, Ohio, with a load of steel billets. This trip resembled a continuous ceremony, as the car was placed upon exhibition in and was visited and inspected by the citizens of the towns passed through. The photograph here reproduced shows the car loaded with coal just before it was turned over by the Illinois Central to the Pennsylvania Railroad.

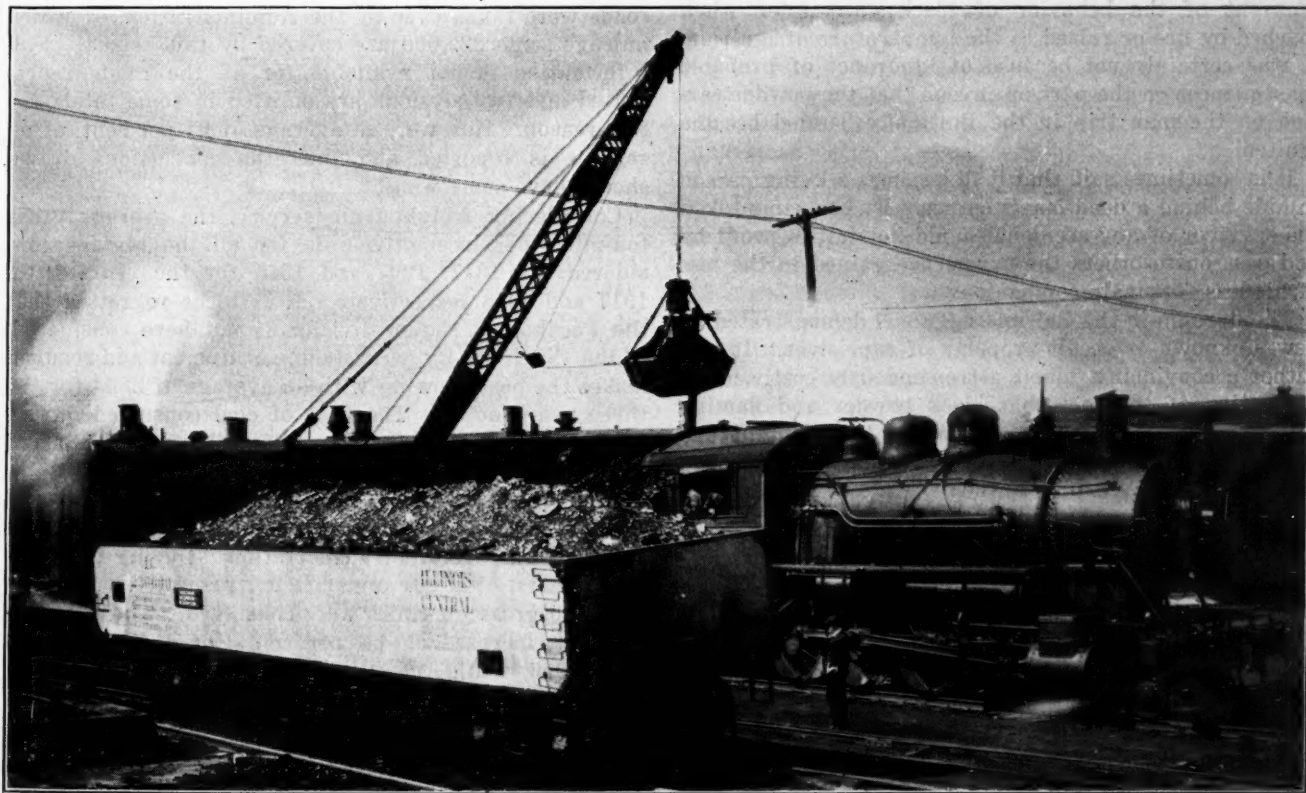
Protecting Pumps Against Acid Mine Water

BY HARRY GOODNOW

Du Quoin, Illinois

A simple, cheap and efficient method of protecting mine pumps from the corrosive action of some particularly bad mine water was recently tried out successfully at Herrin, Ill. After five pumps had been put on the scrap pile one after the other, Elmer Mayor, the top boss, conceived the idea of using beeswax on the parts of the pump exposed to the action of the water. Accordingly, he took apart a new pump, carefully wiped off all grease and dirt from the faces and even from the bolts that clamped the parts together. After carefully heating the clean surfaces he applied the melted beeswax to form an even, thin coating and bolted all the parts together with similarly treated bolts. The pump was then installed and has run without any further attention except the regular oiling. Before the beeswax was tried the pumps lasted from one to three days. The treated pump has been running for several months.

¹See University of Texas Bulletin No. 307.



VIEW OF THE FIRST REINFORCED-CONCRETE RAILROAD CAR BUILT IN THE UNITED STATES

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The Baltimore Tunnel Disaster

WE PRINT on page 55 of this issue the facts, as nearly as they could be learned, concerning the occurrence of the powder flare in the Baltimore Tunnel at Wilkes-Barre on June 5 last, also the verdict of the coroner's jury. Because the impaneled men in this case failed to name a specific cause for the accident does not signify that its occurrence was an act of Providence beyond the power of man to prevent. That the accident in the Baltimore Tunnel could not have been averted no one attempts to assert.

Men who survived the horrors of the disaster on the morning of June 5 last state that they had, and still have, absolute confidence in the carefulness and conscientious thoroughness of the underground foreman. As one of the men who passed through the flare-up expressed it to a *Coal Age* representative: "There ain't no carefuller man in this valley anywhere than that foreman, and yet he had to have that accident." All of which goes to show that the care and pains taken by one man amounts to little if many are involved.

Of all the explosives, of all the dangerous chemical mixtures and compounds man has yet devised, black powder is probably the most universally known. A man's acquaintance with it usually begins when he shoots his first firecracker at the age of five or six, or possibly less. Few, indeed, are the persons who reach mature years ignorant of the behavior of black gunpowder when touched by fire or raised to the temperature of ignition. It was certainly not because of ignorance of probable consequences on the part of anyone that the powder carried on the man trip in the Baltimore Tunnel became ignited.

It is sometimes said that it ill becomes a living person to hide behind a dead man's corpse. By the same token the survivor of any accident should not fail to profit by and pass on to others the experience gained in the loss of his less fortunate companions.

The flare-up in the Baltimore Tunnel demonstrated no new, unknown or occult property of explosives. It was rather a convincing, albeit a tremendously costly, demonstration of the fact that black powder and flaming pit lamps or smoldering pipes form a bad combination. The price of safety in mining is eternal vigilance and painstaking self-sacrifice on the part, not of any one man or any one class or set of men, but upon the part of every living soul in the mine workings.

Well has the union argued that the operator on making the next contract should not seek to enforce a lower wage on the mine worker even if times are bad. The wheel has turned, meanwhile, and the new contract comes with steady work and with a labor shortage in prospect. The mine worker should realize that the moderation with which he counseled the operator he should now exhibit himself.

The Coal Operator's Largest Customer

AT LAST the railroad problem is seen in its true perspective. This, the most important of the country's public utilities, is the arterial system through which flows the lifeblood of the nation. To coal men the railroads are of peculiar interest. Not only would mining be practically paralyzed without rail transportation, but these same public servants constitute the coal industry's best customer. If facts are needed to substantiate these claims the evidence is furnished in a recent report of the U. S. Railroad Administration giving a summary of locomotive fuel performance for 1916, 1917 and 1918.

The three years covered by this report include the stormiest period of the railroads' existence, the culmination of a long siege of public criticism, adverse statutes and Federal and State Commission regulation. Owing to the disturbing influences of the war and Government control and operation, the time is not opportune for the most satisfactory analysis of railroad performance. The favorable aspects of the situation are unity of control and the successful operation under a management able to inaugurate reforms long desired by practical railroad men but impossible of adoption under existing legislation. The report in question was compiled by the Fuel Conservation Section of the Railroad Administration under the management of Eugene McAuliffe, who is prominently connected with important coal interests in the Middle West.

This summary of locomotive fuel performance has to do with both freight- and passenger-train service, and the railroads of the country are included in seven natural groups or regions. In comparing the results attained a number of factors should be considered such as the topography of the country traversed by the roads, extent of territory and the nature of the traffic handled. In round numbers 233,000 miles of the country's railroads were taken over by the Administration, of which mileage some 229,000 are covered by this report. Full information is not available for all the roads represented and two sections are omitted in some totals for this reason. However, an average of 67 per cent. of all regions is reported and thus the conclusions drawn should have some weight.

Considering freight-train service, the average gross ton-miles per locomotive-mile for all the regions considered are 1317, 1297 and 1345 for the years 1916, 1917 and 1918 respectively. It is to be regretted that the Pocahontas region division is not here considered, as the Virginian Ry. with its fine equipment and roadbed makes the best showing with an average of 2364 for the three years noted. The tons of coal consumed during 1916, 1917 and 1918 are, in round millions, 79½, 86½ and 86½ respectively. These are significant figures and show that during 1918 about 12½ per cent. of the total coal mined (689,652,110 tons) in the United States was consumed in rail freight transportation. During the same three years, 192, 201 and 200 lb., respectively, of coal per 1000 gross ton-miles were consumed. These figures show an increase of 4.6 per cent. for 1917 compared with 1916, while there is a decrease of 0.6 per cent. for 1918 compared with 1917.

In passenger-train service an average of 31,215,811 tons of coal were consumed for each of the years 1916, 1917 and 1918. Taking the total of the average amount of coal used for both freight and passenger service dur-

ing each of the past three years, we find that it represents 16.7 per cent. of all coal mined in this country in 1918. A customer who will take one-sixth of our total production is worthy of consideration, but hardly to the extent of mining at a loss in order to supply him with fuel for power to run a business to which we contribute a big slice.

By recognizing, in legislation, the justice of automatically increasing salaries to accord with cost of living, the nation and the various states might keep within their service those faithful servitors who have become fitted, largely at the expense of the state, for the services they rendered. The labor turnover in government departments is one of the most distressing features of the conduct of their affairs.

Motor Trucks in the Mine Fields

LARGE though the sales of automobiles have been in the mining fields, the motor truck appears to be comparatively slow of introduction. The motor truck and automobile are such complements that one would imagine both would be found at the mines together. Where one can run, the other can find its way. The motor truck, no more than the automobile, is kept back by bad roads. Both ran around shell holes and ambled over corduroy in France.

It is true that a motor car cannot do full service on a poor road, but the same may be truthfully said regarding a horse-drawn wagon. We may have to ease the burden to both in order to suit the roads, but even under those circumstances the motor truck is well worth while, whether it is delivering goods from the store, timber for the tippie, props, oil, and rails for the mine or men to various construction jobs. Some operators have put bodies on motor trucks so that they can be made to carry several men. With these vehicles they have run a busline, carrying those of their men who resided in a distant town, forth and back, morning and evening. The uses of the motor truck are endless and when once properly introduced the "gas wagon" will be regarded as essential as any other piece of mining equipment.

He who awards justice may rightly claim justice, but those who do nothing unless they are compelled to such action cannot expect others to show any sense of restraint. Either an equitable wage or a wage of violence and competition, it needs must be. If we choose the last we must not regard ourselves—workmen or capitalists—as unduly injured if the wage game runs against us.

Defective Powder Kegs

IT IS almost impossible to prevent those who have to handle powder kegs from doing it without proper care. Kegs of powder should not be rolled on a steep grade or thrown from hand to hand. Many men climb into moving cars with a keg tucked under one arm and are liable in doing so to jar the keg so that it leaks powder. Every foreman in states which permit of kegs being taken into the mine should try either by his own action or by that of his assistants to find out whether kegs are reaching the working places in a defective condition. He should look over the arriving

kegs occasionally to find out if they are tight. The matter is one not to be overlooked. Where the defects prove that someone is carelessly handling the kegs every effort should be made to find out who it is and to compel him to use more caution.

Defective kegs of powder can be found in storehouses the country over, for men will not use care in handling powder. A man who risks his own life is taking a chance on what belongs to himself. If he is a single man, he may be forgiven for his carelessness. But the man who tosses a powder keg or rolls it so that it is liable to be dented is taking on himself to expose the other fellow to risk. So likewise the man who, seeing a defective keg, fails to report it. Such doings as these, to say the least, are most unchivalrous acts, for every man owes a duty to his neighbor that he cannot lightly overlook.

In order to be successful in foreign coal markets it is necessary that American exporters have some degree of direct contact with the trade, as foreign coal buyers have certain peculiarities individually and locally which are perhaps more linked up with tradition and custom than is true of coal buyers in this country.

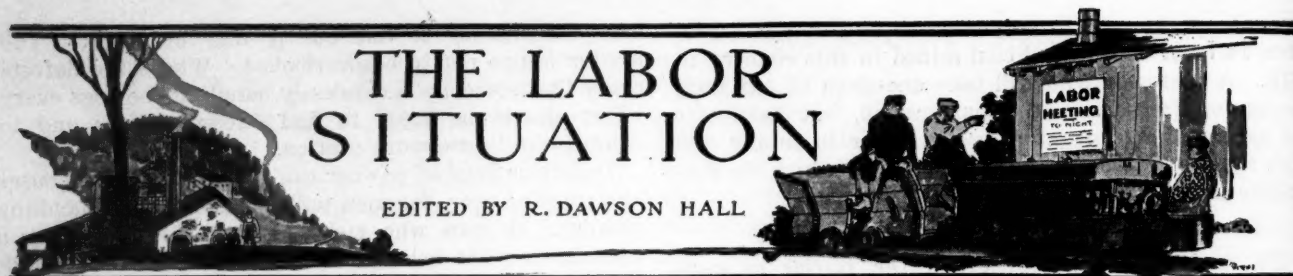
Accelerated Obsolescence

YEARS ago nothing became so hopelessly ancient as to be regarded as useless. So long as a machine would function, however inadequately, and no matter with what waste it turned potential into actual energy, it was still kept in service. Regardless of the progress of invention, the old machine or the old factory was maintained, new parts, duplicates of the old, replacing old parts when rust, fatigue or accident rendered such reconstruction necessary. Nothing was ever pulled down. If it crumbled, and it did not pay to repair it, it was nevertheless allowed to stand in memory of the fleeting years. Art was truly longer than life. The machine might fail to respond to the call made upon it, but as an exponent at least of the art at the time of its creation it was still permitted to exist.

Nothing has marked the progress of the American people more clearly than the willingness of our nationals to recognize obsolescence and to fearlessly cast out anything that newer invention had rendered useless. The metal-mining engineer will replace machinery almost before it is used if the progress of the art demands the change. Does a new development revolutionize the industry, a mill awaiting completion may be torn almost to the ground and be in great measure rebuilt so as to utilize the new method.

The speed of the obsolescence rapidly increases. There was a time when obsolescence could be permitted to hide behind the ample skirts of depreciation, for prosperity decayed sooner than invention dispossessed. But it is not so today. Obsolescence is getting to be a first charge on all kinds of equipment. Just as a change of style shelves clothing quicker even than wear, so a change in engineering practice causes the discarding of a machine even before its bearings have had to be turned.

Miners are coming to realize that most accidents are unnecessary, but they have not learned that sickness is just as preventable as accident. With proper care sickness can be avoided as easily as accidents.



THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

Canada does not appear to be so greatly troubled by would-be nationalizers of industry as does Great Britain (or should it not rather be said as was Great Britain at the close of the war?), for a change seems to have taken place. The House of Commons of Canada received on July 1 a report from the Commission on Industrial Relations in which many reforms are suggested, but among them does not appear nationalization of industry.

The majority of the body favors the eight-hour working day, the principle of collective bargaining, the unqualified approval of the right of workmen to organize, a weekly rest of not less than 24 hours, a minimum wage (especially for women, girls and unskilled labor), public works to relieve unemployment, government aid in building workers' homes, full liberty of speech and press, the establishment of industrial councils and state insurance against sickness, unemployment and old age. Apparently, nothing is said as to nationalization of industry. It is not popular in Canada, and in England 200 conservatives in the House of Commons who have been keeping very quiet for fear of appearing to antagonize the coalition ministry are determined to keep silence no longer, as there is now no enemy in the field. They have met Andrew Bonar Law, their representative in the cabinet, and have received assurances from him that he does not believe in nationalization of the railroads. He denies that the question of nationalization is bound up in the Government's transport bill and affirms that he believes that nationalization is an evil. "Stand by the Premier," is no longer an effective slogan in Great Britain, and Lloyd George's wishes are no longer the nation's laws.

The matter of nationalization in Great Britain and in Canada needs our careful attention. Many of our labor leaders are of British birth, and while they are thoroughly naturalized they are nevertheless disposed to look to Great Britain for suggestions as to the conduct of labor matters. If Great Britain should turn toward nationalization, there would be not a few labor leaders of British extraction who would like the United States to show similar bad judgment.

In the anthracite region the mine workers seem to desire to make the eight-hour day secure by obtaining it for everybody, even those who merely put in their time watching a pump or a fan. Running a fan, especially, is the very job for which the word "sinecure" should have been coined. The contemplative philosophers who have this job to perform hardly turn a hand from the time they go on the job till the time they quit. All they have to do in many cases is to see that the fan keeps turning all the time. The only sacrifice they make is abstention from home, family pleasures and domestic duties.

The contemplation of the beauties of nature may be extended to long hours without putting undue stress on the unsophisticated contemplator. But the mine workers want all men held down to eight hours whether they toil or thumb-twiddle.

As has been said, the mine workers and operators of the New River district have been meeting in the hope of writing a new agreement, and they have made good progress as far as working and wage conditions are concerned. The rock on which they split is the check-off. They want only small wage concessions, but they are adamant on their declaration that the operators take the names of members of the union from the local secretaries and check off on the pay rolls the dues of all those thus named.

The operators say this is illegal, that they cannot deduct the check-off without an order from the employee himself, specifically ordering or at least permitting it. The men want a closed shop. They don't care if a man votes as a union man, so long as he pays the taxes the union imposes.

The following significant statement appeared in the Industrial Relations Commission's Majority Report to the House of Commons in the Dominion of Canada: "The commission believes that the day has passed when an employer should deny his employees the right to organize—a right claimed by employers themselves and not denied by the workers. Employers gain nothing by opposition because the employees organize anyway, and refusal only leaves in their minds a rankling sense of injustice. The prudent employer will recognize such organization and deal with its duly accredited representatives."

The conferences started at Atlantic City and commenced anew at Charleston on June 26, ending at an early hour on Saturday morning, June 28. The scale committee representing the operators consisted of C. C. Beury, G. H. Caperton, H. M. Bertolet, S. A. Scott and William McKell, while that representing the mine workers consisted of J. R. Gilmore, Adam Wilkinson, Robert Gilmore, Lawrence Dwyer, L. M. McNeil, Mote Thompson, Lawrence Peppard, C. L. Noble, Alfred Lindner, Nick Geis and George Scott.

The mine workers' unions in Murphysboro, Jackson County, Illinois, have on foot a move-

ment to join with other unions in the vicinity to start a coöperative store in the city along the celebrated Rochelle coöperative lines. The store will sell goods at current prices and pay dividends to purchasers in proportion to their purchases.

The Kathleen mine at Dowell, Ill., 5 miles south of Du Quoin, and owned by the Union Colliery Co., of St. Louis, Mo., has been idle since Tuesday morning, July 1, when the miners working at that plant came out on strike. The grievance is over a difference in wages paid the loaders for taking out top coal, and the entire top and bottom force laid down their tools and refused to work until the difference was settled. All efforts made to reach an amicable settlement so far have failed. The shutdown is distinctively felt in Dowell, Elkhville, St. Johns, Sunfield and Du Quoin.

A strike was called at all the mines of the J. R. Crowe Coal and Mining Co., near Pittsburg, Kan., to take effect July 2. Alexander Howat, president, and the board of District No. 14 ordered it. It is charged that the company has made a change in working conditions. The union men say the company should go back to the old conditions and submit the proposed changes to the officials of the operators' association and the union leaders. There are five of the Crowe mines. The company also has two steam-shovel plants. Altogether about 1000 men are employed.

In the Alabama district there have been two general wage conferences relative to the scale. On June 27 a joint conference was held, and the mine workers presented a scale which the operators rejected. The mine workers' president, Young, declares the men will stand firm, and a strike seems imminent.



WHAT THE ENGINEERING SOCIETIES ARE DOING

Economic and Business Training for Engineers

At the final session of a two-day conference, held in Washington, June 23-24, resolutions proposed by the conference committee of prominent educators were passed favoring the addition to engineering curricula of courses in general economics, cost accounting and business law and urging that the economic phases of engineering subjects should be emphasized in commercial instruction and that the institutions which have departments of engineering and economics or commerce be urged to consider some plan of coördination to develop a course to prepare men to meet the demand for large numbers of technically trained men for both foreign and domestic commerce.

This conference was called by the Commission of Education through Dr. Glen L. Swiggett, specialist in charge of commercial education in the Bureau of Education, and a representative committee of educators. There were about 155 present from all sections of the country, the discussion centering on the announced subjects of business training for engineers and engineering training for students of business, and on the results of the war experience as affecting technical education and foreign trade.

At the first session, Dean Anson Marston, of Iowa State College, led the discussion on business training for the engineer. Spencer Miller, vice president of the American Society of Mechanical Engineers and of the Lidgerwood Manufacturing Co., New York, placed first the need for developing character and outlined the qualities needed in engineering salesmen and the golden opportunities awaiting them. In the discussion was pointed out the danger of attracting too many men from the fields of design and research work, and the fact that it would be a mistake for all colleges to begin to train business engineers. Prof. G. H. Follows, head of the department of commercial engineering, Carnegie Institute of Technology, Pittsburgh, outlined by chart the course given in his department, and declared that a complete commercial training filled four years, it being almost impossible for men who had taken ordinary engineering courses to become managers of men.

Prof. Walter Rautenstrauch, Columbia University, in discussing engineering training for commercial enterprises, insisted that no worth-while instruction could be given without highly paid teachers. A department of manufacturing is contemplated at Columbia as a 6-year course. E. F. Dubrul, president of the Pyro Clay Products Co., Cincinnati, claimed that the science of business was as broad and its ethics as high as any profession, and that executives are highly paid because they control both the engineering production and the commercial or distribution phases of industry. Money will be provided by business men if the educator will

show willingness to adopt new methods for supplying the kind of graduate they need—the course to be devised in conference. He called attention to the new college of engineering and commerce at the University of Cincinnati as offering a coöperative course of large promise. In the discussion a Colorado executive was cited as authority for warning against too many business engineers, claiming 50 technical men were needed to 1 executive.

The third session was devoted to the significance of the war experience for engineering education, a paper by Maj. General John F. O'Ryan, of New York, being read by Mr. Swiggett. He pointed out the shortcomings of the present educational system in character training and suggested as a remedy the inclusion of non-sectarian moral law developed and applied by courses in psychology, leadership, responsibility, physical training.

Dr. Charles R. Mann, chairman of the advisory board, committee on education and special training of the War Department, pointed out that both army men and practicing engineers place character first. He raised the question as to just what is meant by the "fundamentals" which so many advocate, and claimed that these fundamentals are at once apparent if the army method of beginning with a definite job is followed. Thus the motive—motivation—is developed, and results follow because the student is doing something definite and learns to think on the job. Morale is a dominant factor, better than character as a test, and he would judge class work by group morale. The teacher should be a friendly investigator trying to lead the student to his best attainments rather than one who merely tries to meet certain set standards—and generally failing in a large proportion of cases. The classification and rating system of the army should be applied, helping to measure accomplishments. The chairman, Major-General W. M. Black, Chief of Engineers, U. S. Army, advocated less individualism and the development of more coördination; also training for self-mastering through the subordination of passion to duty.

The work of the Engineer School at Camp Humphreys was described by Dean Evans, Toledo University, who had inspected the work in mechanics and by Professor Hatt, of Purdue University, who inspected the work in engineering. Both testified to the evidence of high morale attained through the assignment of concrete problems, forcing the men to face a real design or investigation situation, used as the basis for developing principles. Professor Hatt emphasized the need for developing a science of education.

At the last session, on training for overseas engineering projects, A. W. McLean, director of the War Finance Corporation, Washington, emphasized the need for financing foreign investments and for this country to assume the lead in foreign fields, claiming that engineers and business men can take the position of leadership if

they have the courage and enterprise. C. H. Gardner, of the American International Corporation, New York, advocated more training in vision to see opportunities, especially in transportation, saying that the engineer should be the pioneer. He would have French and Latin required for college entrance. W. W. Nichols, chairman of the American Manufacturers' Export Association's committee on education, pointed out that industry and engineering are mutually dependent, that pure engineering belongs only to rare genius, and that the rank and file of engineers need a practical training. Foreign languages should be taught to develop knowledge of the customs and mental attitude of foreign peoples.

Dr. Jeremiah W. Jenks, research professor, government and public administration, New York University, in an illuminating address, showed two kinds of problems—to get trained men at once for overseas service and to develop such men for holding future supremacy in foreign trade. He classed commerce as one of the humanities, on a par with history and economics. Credit should be furnished in the foreign field, but only by controlling stock interests in order to insure wise and successful management. The discussion by men connected with industrial concerns interested in the foreign field developed the necessity for long-time credits and for using ingenuity to find men with language qualifications and also with sufficient technical knowledge to represent them abroad.

Western Branch of Canadian Mining Institute Holds General Meeting

Coal-mining men were in the majority at the general meeting of the Western Branch of the Canadian Mining Institute held on June 4 and 5 at Nanaimo, B. C. All the collieries of Vancouver Island were represented and some of those of the lower British Columbia mainland, but many of the persons expected did not attend because the steamboat service between the island and the mainland was interfered with by a strike of the mercantile seamen.

W. M. Brewer, Government Mining Engineer, with headquarters at Nanaimo, occupied the chair and, after the announcement of the Institute officers for the next year, the formation of a coal-mining section was discussed. The idea met with unanimous approval. It was felt that such a move would bring about a revival of interest among coal-mining men in the work of the Canadian Mining Institute. Those belonging to the proposed section could hold their meetings independent of the parent body, transact business having to do solely with the coal-mining industry, and adopt policies calculated to benefit the business of coal production both in relation to legislation and in regard to matters affecting only the collieries. At the same time it would be a part of the Canadian Mining Institute, its members would be members of the Canadian Mining Institute with all the privileges accruing to the same.

The first step was the appointment of a committee consisting of Thomas Graham, general superintendent of the Canadian Collieries (D), Ltd.; George O'Brien, manager of No. 4 Colliery, Canadian Collieries (D), Ltd., and John Hunt, general superintendent of the Canadian Western Fuel Co., Ltd., to nominate a chairman and a council of five of the new section. The committee's report, which was adopted, made the following selection: George Wilkinson, chief inspector of mines for

British Columbia, chairman; James Hargreaves, instructor in connection with the technical branch of the Provincial Educational Department, secretary and editor; John Hunt, superintendent Canadian Western Fuel Co.; Thomas Taylor, Pacific Coast Coal Mines, Ltd.; R. R. Wilson, manager, Granby Consolidated Mining and Smelting Co.'s coal mines, Cassidy's; Francis Glover, manager, Princeton Coal Mining Co.; Charles Graham, district superintendent, Comox Colliery, Canadian Collieries (D), Ltd., councillors.

The afternoon session was devoted to the reading of papers as follows: "Taxation of Mines," by T. W. Bingay; "Mining Development in Northern British Columbia," by E. J. Conway; "Memorandum re Returned Soldiers Prospecting Organization," by Mortimer Lamb; "Tunneling at the Front," by Major A. W. Davies. Mr. Bingay's observations were along the same line as those he made at the recent International Convention at Vancouver. An interesting account of mining activity in the northern districts, with particular reference to the work on the Hidden Creek mine of the Granby Consolidated Mining and Smelting Co. near Anyox, was the subject matter of Mr. Conway's address.

Mr. Lamb, in his memorandum, dealt with the proposal of the Canadian Mining Institute that the Dominion Government extend financial assistance to enable returned soldiers, with the necessary qualifications, to go into the hills for the purpose of prospecting. He pointed out that there were many who would prefer this to taking up land or to settling in cities; that it was a means whereby the latent mineral resources of the country might be brought to light and their development facilitated.

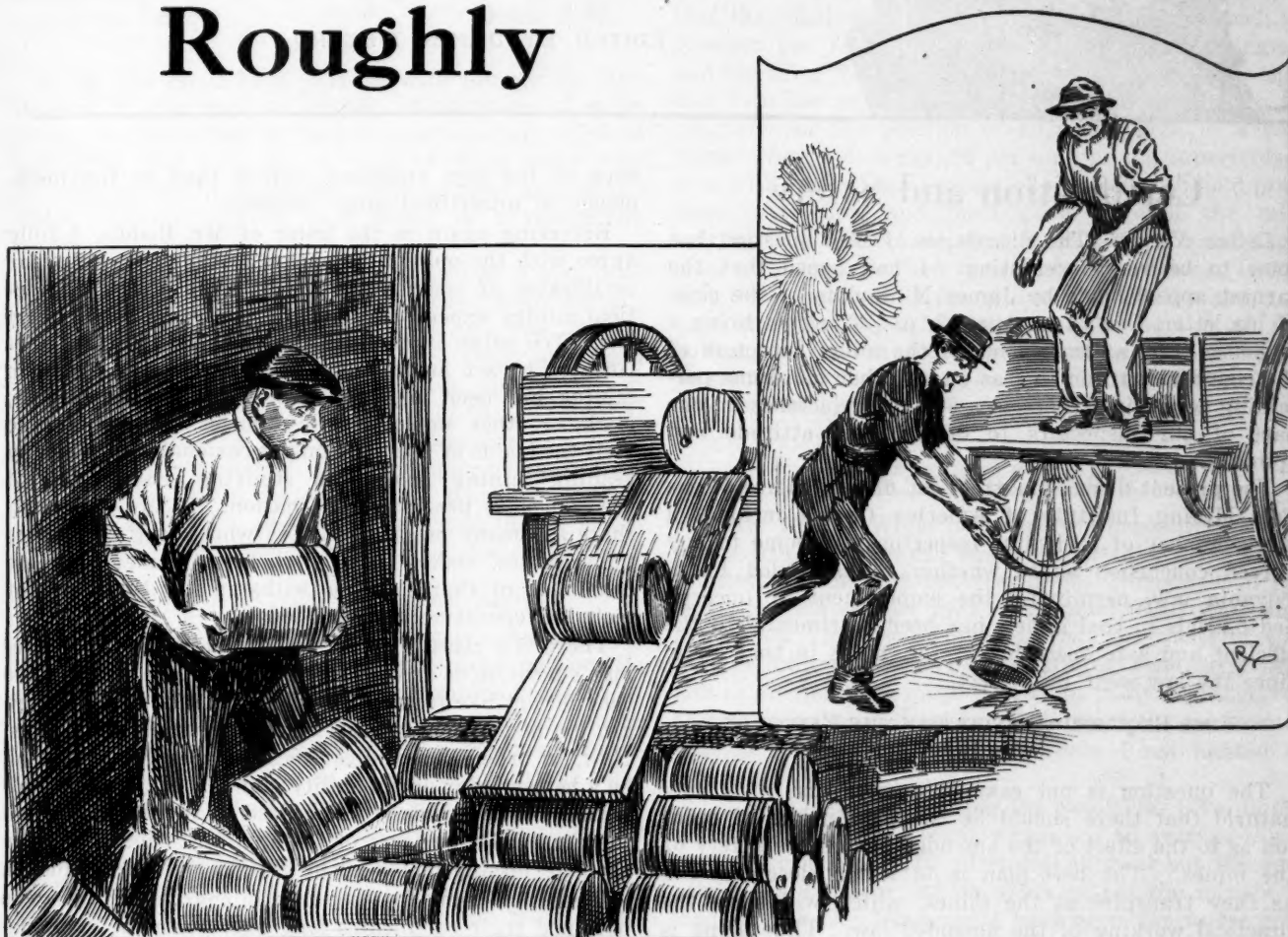
Major Davies' address was one of the most interesting presented, being a personal account of some of his experiences in tunneling operations on the western front. He spoke of the difficulties with which those who burrowed under the enemies' lines had to contend, of the fortitude of those so engaged, of their successes and failures.

The evening meeting was marked by the presentation of four papers, all of which related to coal mining. The first was entitled "Notes on Coal-Mine Air Sampling," by Dudley Michel, of the first-aid department of the Provincial Bureau of Mines. James Hargreaves followed on "Technical Education and its Relation to Coal Mining"; Charles Graham on "Regrading Slopes No. 4 Mine, Cumberland"; and H. H. Sanderson on "Development and Operation of Mine-Rescue Apparatus."

On the morning of June 5 the delegates visited Cassidy's, the site of the new coal mine of the Granby Consolidated Mining and Smelting Co. They were escorted over the plant by Mr. Wilson, the manager. The plant was pronounced the best installation yet seen in this part of Western Canada.

Returning to Nanaimo the party augmented by a large section of the coal-mining fraternity of the city, witnessed at the Nanaimo Government Mine-Rescue Station a demonstration of the use of the Gibbs and the Paul mine-rescue apparatus by two mine-rescue corps, one from Ladysmith and the other from Nanaimo. The Ladysmith corps consisted of T. Davis, M. Thompson, A. Brown and T. Hunter. The Nanaimo squad was composed of J. Kelly, H. Devlin, Jr., A. Mawhinney and J. Brown. The event closed in the evening with a delightful smoking concert which was largely attended.

Don't Handle Powder Kegs Roughly



You may think it safe to handle powder roughly because there are no lights nearby. It isn't safe, of course, though you may think it is. But even if it were safe—for you—it would be dangerous for others who have to take the kegs underground and handle them with lights on their heads. There never was a keg made so strong that it could not be sprung and caused to leak if handled with sufficient indifference to possible damage.

Remember
a Powderman Holds the Lives of Men in His Two Hands



DISCUSSION *by* READERS

EDITED BY JAMES T. BEARD

Certification and Safety

Letter No. 10—The discussion of this question has come to be very interesting. I had hoped that the earnest appeal made by James M. Roddie at the close of his letter, *Coal Age*, Apr. 17, p. 723, would bring a response from at least some of the mine inspectors of the country; but, on this as on all other questions pertaining to mining, there is a strange reluctance on the part of our inspectors to define their attitude and opinions.

The present discussion grew out of the failure of the Coal Mining Institute of America (which includes a large number of coal mine inspectors) to come to any agreed conclusion as to whether the amended Pennsylvania law, permitting the employment of uncertified officials in coal mines, has been detrimental to the efficient and safe operation of the mines in that state, since the law went into effect.

TIME REQUIRED TO ASCERTAIN THE EFFECT OF THE LAW

The question is not easy to answer and it is only natural that there should be some difference of opinion as to the effect of the amended law on the safety of the mines.¹ The best plan is to watch closely events as they transpire at the mines, which will show the practical working of the amended law. Time alone is required to show the effect of the enactment on the conditions of safety of mining operations.

How long the amended mining law has been in force, permitting the employment of uncertified mine foremen, I cannot say.² I presume it is since the commencement of the war. As we all know, many of our coal mines were then operated under abnormal conditions. Discipline and vigilance gave way to the production of a greater output of coal, while hundreds of new and inexperienced men flocked to the mines seeking employment. Under the conditions that prevailed on this account, it seems only natural to believe that the accidents and injuries reported as having occurred during the period of the war were largely due to the inexperience

of the men employed, rather than to the inefficiency of uncertified mine foremen.

Referring again to the letter of Mr. Roddie, I fully agree with the opinion he expresses that applicants for certificates of competency should have a longer practical mining experience than the five years required by law. Too often it happens that men are granted certificates to act as mine foremen whose experience in mining has been no more than that of a timekeeper, clerk, or other employee whose duties required him to visit the inside of the mine only occasionally but who, by reading mining books and studying, have prepared themselves to pass the examination. In my judgment, there are many practical miners whose long experience underground makes them more fit to manage a mine than men of that class, notwithstanding their lack of technical education and knowledge.

There is a class of miners who regard the mine foreman's position as an easy one and seek to gain it because they do not like to work, and I regret to add that there are too many of this class who are granted certificates. Now, in order that the certificate granted a man shall be a better index of his ability and efficiency, the examination should be made more rigid in its character, and the practical experience of the applicant should be made the determining factor in the granting of the certificate.

There are many foremen now in charge of mines who obtained their certificates long ago, when the examinations were not as rigid or technical as is required today. Many of these, from the time they obtained their certificates, have paid little or no attention to the study of mining questions and, of course, made no advance along this line. They are satisfied to think that the possession of their certificate is all that is necessary.

MINE FOREMEN NEED TO CONTINUE TO STUDY

It goes without saying that men who do not read and study fall far behind present-day requirements. On this account, it is my opinion that good results would follow if all certificates were limited to a period not exceeding ten years, and must then be renewed by the holder being required to pass another examination. This would have the effect of keeping men reading and studying the many problems in mining and make them progressive and up to date.

Four years' experience as state mine inspector brought me in contact with many mine officials and taught me that many men who hold high-grade certificates are less competent to manage a mine safely than others holding a lower grade of certificate. To know how to operate a coal mine according to scientific and practical methods is one thing, but to apply this knowledge is quite another thing, and here is where many men who have passed the examination fail in practice.

In my judgment, the efficient mine foreman is the man who has plenty of both technical and practical min-

¹It will be remembered that the Mine Inspectors' Institute of the United States of America, at their eighth annual meeting, June 10, 1915, St. Louis, Mo., discussed this same question at great length and unanimously adopted the following resolution: Resolved, that it is the sense of the Mine Inspectors' Institute that, in order to secure the greatest degree of safety in the operation of coal mines, it is absolutely essential that candidates for all positions of authority in respect to underground operations should be required to qualify for such positions by passing an examination that will show their fitness and competency to conduct the operations in a mine in a safe manner. *Coal Age*, Vol. 9, p. 928; Transactions of the Institute, 1915, p. 74.

²The amendment to the bituminous mine law of Pennsylvania, legalizing the employment of uncertified mine foremen, took effect June 1, 1915. The need of the amendment grew out of the adoption of the Compensation Law that made coal operators responsible and liable for injuries from accidents in their mines. The claim of the operators was that the liability rested with the state as long as operators were compelled to employ only mine foremen whose competency was certified to by the state. The matter was compromised by amending the law to permit operators to employ either a certified foreman or one "equally competent."

ing knowledge, a long experience and the energy to utilize these qualifications in the operation of a mine, and certification should depend on methods that clearly demonstrate these qualifications for service.

Dayton, Tenn.

JOHN ROSE.

Letter No. 11—I have followed with interest the discussion of the relation of the certification of mine officials to the safety in the mine, and can say, without hesitation, that I am not in favor of doing away with the examination of candidates for mine foreman's certificates. In my opinion, that would be a retrograde movement.

While it is true that a certificate held by a man does not make him better or worse, it does show certain traits in his character and marks him as a man possessing more or less ability and having a reasonably good character. This is evident, as readily appears, when we consider that there are a number of things required of a man before he can take the examination for a certificate of competency. For example, he must be a citizen of the United States and, in Pennsylvania, must have had five years' practical experience in the mines of that state and be sober and of temperate habits.

WHAT THE CERTIFICATE DOES SHOW

The fact that a man holds a certificate shows that he has sufficient education to reason a thing out and is able to perform at least most of the duties required of a mine foreman and calling for a knowledge of the theory of mining or, in other words, a technical knowledge. It also shows that he is familiar with the mining laws of the state, as a large number of the questions asked in examinations, today, concern the requirements of the law in the operation of mines.

The oral examination that the candidate must pass is intended more to show his knowledge of mine gases, their behavior and where they are to be found in the mine, besides ascertaining the man's ability to detect the presence of gas and protect the men placed daily in his charge. In fact, the certificate that a man holds is a mark of his general intelligence on the subject of coal mining.

WHAT STUDY DOES FOR A MINE FOREMAN

Consider, for a moment, the man who has a limited education, one who left school when he was 11 or 12 years of age, as I did myself. If such a one makes no attempt to study and improve himself, he will grow up to have a very narrow view of things. On the other hand, if he starts to study and takes a course of lessons and masters them, everything will appear to him in a different light than before. It is like the view from a porthole being suddenly enlarged to take in the entire horizon.

There is no question but that a practical man is a good asset in mining; but when practice is supplemented by a knowledge of theory, the benefit is far greater. Therefore, while a certificate is not worth more than the paper it is printed on, its possession shows a knowledge that is of far greater benefit to the man who has gained that knowledge by studying and reading. No one can convince me that a man who has gained his certificate by hard study is no better than the man who has not studied and holds no certificate. Today, no good reliable company thinks of employing

an uncertified mine foreman if a certified man can be secured.

Only recently, I attended a superintendents' meeting where the management gave the men to understand that they desired them to employ only certified men as foremen and assistant foremen. Things are changing and changing fast in this respect. It used to be that any man having a good education was thought to be all right for the position of superintendent of a coal mine. Now, I dare say, 90 per cent. of the superintendents with whom I am acquainted are men who hold first-class certificates and have gone through the mill, serving as fireboss, assistant mine foreman and foreman, until they reached their present position. Therefore let me advise any young man that has his eye on a superintendent's job to get busy and start from the bottom, as that is the only way to climb the ladder to success.

THOMAS HOGARTH.

McIntyre, Penn.

Waste of Coal

Letter No. 7—While it is not my disposition to find fault with the methods employed in this, my adopted country, I could not but feel deeply interested in the letter on this subject by F. C. Sanner, *Coal Age*, May 22, p. 964. It is only too true that the waste of coal in this country is enormous. Mining conditions here and in England are quite similar in many respects, but there is not the same waste in mining in the old country that is manifest in this field where I am located at present.

Let me illustrate by citing the conditions here, in the working of the No. 3 seam, which has an average thickness of from 5 to 7 ft. The coal is good but the roof conditions are poor, which often causes the miners to load dirty coal. However, I have seen far worse conditions in mines. The only method employed in the working of this coal seems to be the panel system. The panels are about 400 ft. in depth, while the rooms are driven on 33-ft. centers.

In more than one instance, I have seen rooms driven 40 to 50 ft. in and then abandoned because of a roof fall in the room. No effort would be made to recover the balance of the coal in such rooms, but the track would be pulled out, and that was the end of it. The No. 4 seam, which is also worked here, has a thickness in some mines of only 3½ or 4 ft. The same method of mining is employed in this seam, but the waste of coal is not quite as large as in No. 3 seam.

RESULTS OF FREQUENT CHANGES IN MINE FOREMEN

In one mine, in particular, the conditions are something that would turn a practical mine foreman's hair gray in a short time. There is hardly a straight road in the mine, and the output is from 400 to 600 tons a day. The condition in this mine is the result of having changed bosses frequently. Most of these men knew nothing more than the panel system of mining, which was the limit of their experience. They received their certificates long ago, before examinations in mining were as strict as they are today.

Now if a practical mine foreman who has had experience in different methods of mining and understands longwall work could be given a free hand in this mine, it would not be long before he could raise

the tonnage to 1000 tons a day, by adopting the long-wall method of mining, and installing Blackett conveyors at the working face. Coal-cutting machines are already employed in this mine, but the waste of coal will continue until improved mining methods are employed.

Ind.

MINE FOREMAN.

Specific Gravity Determination of Coal

Letter No. 3—Only recently I have been able to read carefully the extremely interesting letter by H. M. Chance, which appeared in *Coal Age*, Jan. 9, p. 68, concerning the specific gravity determination of coal. As his letter refers, in part, to my previous article on the routine determination of the specific gravity of coal, I may be permitted to add a few words.

Dr. Chance refers to the close agreement of my figures. Attention should be directed to the fact that most of the figures given were averages, and that the agreement may be largely ascribed to the law of averages. The method described by me was offered simply as a routine method, and particular accuracy was never claimed. The accuracy stated in the paper was given as 0.02 unit of specific gravity.

ANALYSES PROVE SPECIFIC GRAVITY DETERMINATION

The average specific gravity of the ash of the hard white-ash coal referred to in my previous paper would, I am convinced, be as high as the figures given by Dr. Chance, namely, 2.55, or 2.56, which figures he considers surprisingly high. I have selected about twenty analyses of the material commonly designated at the mines as "slate." These analyses were merely picked out at random, and show the following average approximate results:

Specific gravity.....	2.34
Ash content.....	72%
Sulphur content.....	0.96%

The twenty coal analyses from which these figures were averaged show ash percentages varying from 48 to 86 per cent.

Hard white-ash coals do not commonly contain a large quantity of pyrite; in fact, the average sulphur content of such coal lies between 0.70 and 0.80 per cent.

Dr. Chance calls attention to the variation in specific gravity of coals from different districts. This is an important point and one that is quite frequently neglected in practice. We have noticed that, for a given ash content, coals from different districts will have quite different specific gravities. The following table shows the specific gravity of coals from different districts, the figures being the average corresponding to an ash content of 18 per cent. Results showing average sulphur content are included as a matter of interest.

Classification of Coals	Specific Gravity of Coal with 18 Per Cent. Ash	Per Cent. Sulphur
Hard, white ash.....	1.68	0.70
Free-burning white ash.....	1.66	0.74
Schuylkill red ash.....	1.62	0.62
Locust Mountain.....	1.58	0.85
Lorberry.....	1.56	0.66
Lykens Valley.....	1.56	0.56
Shamokin.....	1.51	0.95

It seems of interest to note here that, in the case of freshly mined anthracite, the specific gravity decreases with an increasing volatile-matter content. For

a difference of 0.17, in specific gravity, as shown between the two extremes in the table above, there will be a corresponding difference of over 3 per cent. of volatile matter, the lower specific-gravity coal having the higher volatile-matter content. With decreasing specific gravity, coals of a given ash content will show a relatively higher heating value.

Dr. Chance calls attention to the possible differences in the specific gravity of the ash of coal and the specific gravity of the ash of the so-called "slate." There is no question but that the data suggested by Dr. Chance could readily be obtained and published. I have myself taken just such low-ash samples picked free from bony coal or slate, such as referred to by Dr. Chance; but the specific gravity of the samples was not determined at the time, and they were not kept. One such coal sample contained only 1.2 per cent. of ash.

Results of some tests made on 14 samples of hard white-ash coal, the size known as "broken," showed an average specific gravity of 1.61, corresponding to an ash content of 9.02 per cent. and a sulphur content of 0.68 per cent. I would assume that the specific gravity of ash-free coal of this nature would be approximately 1.52.

PRACTICAL USE OF SPECIFIC-GRAVITY METHOD

Observation inclines me to believe, however, that, for the theoretical purposes brought out in Dr. Chance's letter, the specific-gravity determinations ought to be made by a more accurate method. The method described by me is simply a routine method and one that gives reasonable accuracy with little expenditure of time, and is adapted to finely crushed-coal samples.

Departing somewhat from the subject under discussion, if I may, allow me to direct attention to a possible use of specific-gravity determinations; namely, the means they afford of judging the quality of the smaller sizes of coal, at the breakers. The specific-gravity figures offer a more reliable standard by which to judge the ash content of small coal than does the amount of slate found by an inspector.

Moreover the specific-gravity determination can be made in less time. A small crusher could be installed to crush the coal sample, in order that a representative sample be thus obtained for making a specific-gravity determination; although the specific gravity might be determined on a larger sample, by means of a somewhat modified method, or by any different method. I simply mention this matter briefly, as it was not my purpose to discuss this aspect of the proposition, in this letter.

A. G. BLAKELEY, Chief Chemist,

Philadelphia & Reading Coal and Iron Co.
Pottsville, Penn.

Mine-Haulage Proposition

Letter No. 3—Looking over *Coal Age*, under date of June 5, p. 1053, I came across the inquiry of J. H. Dickerson, of Cambridge, Ohio, with regard to a proposed change in the hauling system of his mine. To many people Mr. Dickerson's inquiry might give the impression of inability on his part. However, the real mining man is never afraid to accept the viewpoint of his fellows; nor yet is he adverse to criticism when it is conducted along legitimate lines.

If we mining men, as a whole, adopted Mr. Dickerson's system with reference to many a problem that might come before us it is safe to say that considerable benefit

would result to all concerned. The problem he presents is one that most mining men run up against, from time to time, and no doubt will bring out much valuable comment from the more advanced readers of this valuable magazine, which we have learned to love.

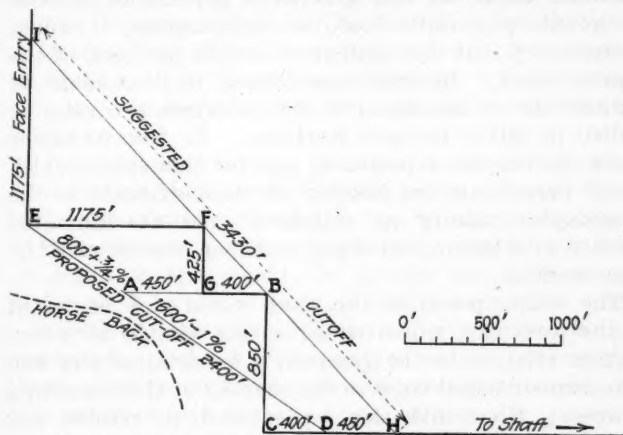
To begin with, insofar as the grades go, the old haulage road is the most favorable. The difference is so slight, however, that this factor need not be considered in opposition to the adoption of the new system. Eliminating the sharp curves at *F*, *G*, *B* and *C* on the old road will provide a more direct and ideal haul, and it should be possible for the motors to make better time even considering the slight plus grade between *E* and *A*.

ESTIMATING THE DAILY SAVING BY THE CHANGE

Assuming that the original trip speed is maintained on an average over the entire haul after the change has been made, the output will increase in proportion to the decrease in the haulage distance. In other words, the output will be increased 85 tons per day, without increasing the original haulage equipment or crew. To be on the safe side, however, we will deduct 25 per cent. from this increase, and assume that the net gain is, say 65 tons per day, making total output, per shift, of 1265 tons.

Now, I will assume that the coal, f.o.b. the mine, is valued at \$3 per ton, which is a conservative figure. Also, I will assume that the same underground and surface company force is capable of handling this increased output. If so it will mean a saving of \$195 per day, or a net reduction on the increased output of 15c. per ton. This, to my mind, is the most important factor entering into the whole subject.

Should the plus grade, shown at *EA* on the proposed cutoff, interfere with the efficiency of the motors, no



SHOWING ANOTHER PROPOSED ROAD

great difficulty would be experienced in cutting this grade down, later. Any time lost, however, in ascending the plus grade *EA*, should be easily offset, during the descent of the minus grade from *A* to *D*.

To go into the proposed change fully it is very necessary to have more data relative to local conditions. Mr. Dickerson does not state the size, amount, or cost of timber required for the cutoff, or the amount of bottom brushing or other rockwork to be done in order to secure the necessary height and width and the proposed grades. The efficiency of the labor available and the wages paid will also be a big matter for consideration. On the whole, however, I can see no serious difficulty in the way if the conditions existing through-

out the entire length of the cutoff *ED* are at all normal. Mr. Dickerson states that he has two million tons of coal in sight. Then, assuming that he proceeds with the new road and increases his daily output 65 tons per day, estimating on 260 working days in a year, the tonnage in sight, assuming a 90 per cent. recovery, is sufficient to keep the mine running at the increased output. If so it will mean a saving of \$195 per day, output for 5.47 years. Should the market value per ton remain at \$3 during the entire period mentioned and an output of 1265 tons per day be maintained, the actual saving in that time will run well into six figures.

As already stated, Mr. Dickerson has not supplied sufficient data with regard to local conditions, and one is liable to be considerably off when figuring the ultimate cost of the proposed change. I would, however, place the cost of completing the proposed cutoff at not more than \$20,000, including all labor and material, which amount would be returned in less than four months' operation on the new road. Moreover, owing to the total haul between the face entry and the shaft being reduced in length, there should be a corresponding decrease in the per-ton cost for maintenance, during the entire life of the mine.

SUGGESTS ANOTHER PROPOSITION

In my opinion, if I may be allowed to criticize the proposed change, the better and most economical method would have been to commence the cutoff road at *H*, 850 ft. outby, or toward the shaft, from the point marked *C* on the plan, and with a deviation of 45 deg. from the line *CDH*. This cutoff would touch the point *B* and cut through the corner at *F*; and, assuming the face entry maintains the course shown on the plan, this cutoff would connect with the face entry at a point 1175 ft. from the point *E*. The total length of this route *HI* would be 3430 ft., as against 4875 ft. on the original haulage route. In Mr. Dickerson's proposed cutoff, the length between the same points *H* and *I* would be 4050 ft., or a difference of 875 ft. in favor of his proposed cutoff.

With a cutoff such as I have proposed, it will be possible to reduce the entire length of the haul from the face entry to the shaft 1445 ft. My proposed method, however, would only hold good provided suitable grades could be maintained throughout its entire length. Being further away from the horseback shown on the plan, I would assume that the roof conditions throughout my proposed route would be much better than that of the route proposed by Mr. Dickerson.

If such grades could be secured that would permit the original trip speed to be maintained the reduction of the haul, by adopting my proposed route, would mean that the output would be increased 147 tons, making the total possible output per shift 1347 tons; and, deducting 25 per cent. for emergencies, we can assume that the actual increase would be 110 tons.

These figures, it is understood, are based on the original trip speed being maintained after the change. If conditions are favorable the latter method is preferable, and would produce much better results than the one proposed by Mr. Dickerson, which nevertheless in itself is good, and should be proceeded with for the following reasons:

1. It will afford a more direct and ideal route from the live workings to the shaft.
2. The total haul will be reduced 875 ft., which means that the motors can haul approximately 65 tons per

shift more than formerly without increasing the haulage crew or shaft bottom force.

3. The first cost of equipping this proposed route should not exceed \$20,000, for all labor and material.

4. Based on the market value of \$3 per ton at the mine, the saving due to the increased output would be roughly \$195 per day, which means that the total cost of equipping the proposed route would be returned in less than four months.

5. Having four and a half years' tonnage in sight and assuming that the shaft and tippie equipment is sufficient to handle the increased output without increasing the day force at the shaft bottom or on the tippie, the proposed change is justified. Even if the saving per ton is on the large side, and the figures quoted be cut in two the day company force remaining stationary, I would still consider the change a good investment and would lose no time in having the proposed cutoff completed and put in operation.

J. H. McMILLAN, General Superintendent,
Jasper Park Collieries, Ltd.
Pocahontas, Alta., Canada.

Labor and Democracy

Letter No. 1—In his cabled address to Congress, President Wilson says, in regard to the labor question:

We must find another road, leading in another direction and to a very different destination. It must lead not merely to accommodation, but also to a genuine coöperation and partnership, based upon a real community of interest and participation (of employees) in control. . . . The object of all reform in this essential matter must be the genuine democratization of industry based upon a full recognition of the right of those who work . . . to participate in some organic way in every decision which directly affects their welfare or the part they are to play in the industry.

Whether or not we agree with the President, we can not but recognize the tremendous importance of his words. If based upon a wrong conception of business principles, or a mistaken theory of economics, their harmful effect upon industry, in general, will be well nigh incalculable, and we should at once make every effort to counteract their baneful influence. On the other hand, if his opinion embodies a sound business principle, based on a true theory of political economy, prudence would dictate that we cast about for a method by which his suggestion may be put into practical and early execution.

However, if we attribute the President's remarks to a purely political motive it will be well to remember that the "Whitely Plan"—a cumbersome scheme looking to the democratization of industry, to the end the President has in mind, and working through joint committees of owners and employees—is now being given a tryout in England.

England, as a natural consequence of the greater density of her population, may be logically expected to arrive at a definite and necessary labor program several decades before the problem can become economically acute in this country. But, because of the stand taken by the President, the question of the democratization of such industries as coal mines, railways and telegraph lines will probably become politically paramount in the campaign of 1920 and there is a possibility, remotely probable, that some legislation looking to this end may be forced on the government.

Viewed from a distance the "Whitely Plan," which is

essentially English, does not lend itself to modification that would permit of its satisfactory application to American industry. Incidentally, there seem to be grave doubts, even among the English, of its applicability to the industries of the British Isles.

Without entering into the question as to whether or not that portion of the President's cabled address dealing with proposed labor legislation is justified by existing conditions in America, we may safely assume that a ball has been started rolling which it will be difficult to stop. But, in the event of our failing to stop or even seriously impede its progress, a carefully thought out and well formulated plan for the democratization of industry will then be helpful.

Charles P. Steinmetz, in his recent article, entitled "How to Compass Industrial Coöperation," *Coal Age*, May 15, p. 904, has demonstrated that, in a very essential particular, the interests of labor and capital are antagonistic. How then, may I ask, is it possible to reconcile these conflicting interests and secure complete coöperation?

Under existing conditions the workman is capable of taking the viewpoint of the workman only. If, in addition to being a workman, he was also part owner of the concern for which he works, his breadth of vision would be so increased as to enable him to complete the symmetry of his outlook. This ability, even though his principal income continued to be derived from his labor, would qualify him to accord his employers a degree of coöperation not possible under present conditions.

CONCRETE EXAMPLE OF DEMOCRATIZING INDUSTRY

Let me assume, for example, that a coal operation valued at \$200,000 employs 100 workmen. In order that the employees might actually participate in both the profits and control of the organization, it would be necessary that they hold or control 50 per cent. of the capital stock. In that case, stock to the value of \$100,000 would be issued to 100 workmen pro rata, or \$1000, in stock, to each workman. In few instances could the man be expected to pay for this stock, which would necessitate the holding of the certificate in the company's treasury as collateral, and charging the worker with interest at 6 per cent. per annum, or \$2.50 semi-monthly.

The voting power of the stock would now be vested in the workman, which would entitle him to all information relative to the company's financial affairs and give him an actual voice in the shaping of the company's policies. He would also be entitled to receive any dividend earned on the company's stock, which, if the corporation were managed with reasonable efficiency, should considerably more than repay the amount deducted from his earnings as interest on his stock.

It is readily realized that many complex details would have to be worked out in order that the organization might have a reasonable degree of flexibility; but the plan seemingly offers no difficulties that are impossible of solution. Properly executed, the plan should fulfill the president's requirements of participation in control and give to workers a voice in the policy of the business that employs them. It should secure for capital a greater degree of coöperation on the part of all employees and a material reduction of labor turnover, while assuring a 6 per cent. yield on 50 per cent. of the total invested capital.

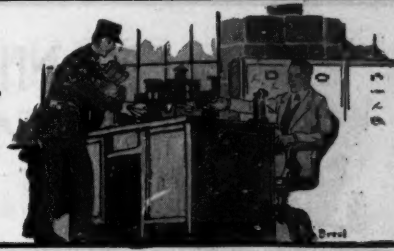
ECONOMIST.

—, Ky.



INQUIRIES OF GENERAL INTEREST

ANSWERED BY JAMES T. BEARD



Installing High-Tension Lines

Kindly explain a safe method of conducting electric power into a mine, a distance of nearly two miles (10,000 ft.) to the working face, for the operation of coal-cutting machines with direct current. According to the best information we have at hand, this proposition is going to be an expensive one, and we are anxious to learn what method can be adopted to insure the greatest safety and reduce the expense of the installation.

_____, Tenn.

The transmission of electric power long distances underground is always attended with danger to the workers employed in the mine and involves, besides, a considerable expenditure in making the installation. Whenever possible, a safer and more economical method to adopt is to sink a borehole from the surface, at a point immediately over the center of distribution in the mine workings, and erect a power line on the surface running direct from the power station to the drillhole. This power line should be carried on substantial supports and the wire cable properly insulated and protected by a covering that will resist the weather. The drillhole should be cased with a pipe and the end of the pipe allowed to extend 10 or 15 ft. above the surface, so as to prevent accidental injury to the conductor where it enters the hole and passes down into the mine.

In general, in long distance transmission, a.c. current should be employed and a transformer installed at the farther end of the line to step down the high voltage of the current, for the operation of the machines in the mine. Or, if the machines are to be operated by d.c. current, a rotary converter should be employed to transform the a.c. current for use in such machines. An a.c. generator has no commutator, it does not present the difficulties due to sparking at the brushes, which always occurs when a d.c. generator is operated at a pressure exceeding, say 500 to 600 volts.

It should be understood, here, that the saving effected in the transmission of a.c. current over long distances, by the reduction in the outlay for copper, will generally cover the expense of installing a converter set. For the same power transmitted, the weight of copper required decreases as the square of the voltage increases. For this reason, economy in transmission demands a high-voltage and small current, which is made possible by the use of an a.c. generator.

To illustrate, the transmission of 30 hp., corresponding to a current of 22 amp. at 1000 volts pressure, a distance of 1 mile, allowing for a 15 per cent. line drop and wire return, would require a No. 8, B & S wire, having a diameter of practically $\frac{1}{8}$ in. But, to transmit this same power at 250 volts (88 amp.) would require a wire having 16 times the sectional area, or 4 times

the diameter. In other words, the second voltage mentioned being one-fourth of the first, requires 4 times the current to produce the same power, and 16 times the weight of copper for its transmission over the same distance. Therefore, as previously stated, the weight of copper required for the transmission of a given power a given distance varies inversely as the square of the voltage, which makes a high voltage desirable in long distance transmission.

It is not always practicable, however, to carry high-tension lines over the surface, in the manner described. Numerous conditions may demand that the power line be conducted through the mine, to the distributing point far back in the workings. In that case, it is absolutely essential that every precaution should be taken to safeguard employees against the danger of contact with the line. As before, a high-tension conductor must be thoroughly insulated and protected from injury, by means of suitable covering throughout its length. In addition, these high-tension cables must be substantially supported by insulated hangers dropped from the roof of the entry, or attached to insulated supports affixed to the mine timbers.

Welding Split Gears to Axle

I want to ask the many readers of *Coal Age* if any of them have had experience in electric welding. At the present time, I have a hard proposition in the shape of a pair of split gears that are a trifle too large in the bore for the axle on which I desire to mount them.

I want to ask if anyone has had a similar job and been able to handle it successfully, either by the process of electric welding or any other means that will serve to hold the gears tight on the axle. In this case, they are to be mounted on the axle of an electric mine locomotive.

If someone who has performed the trick will state the process that he used in welding and the results obtained, the information will be greatly appreciated. If the acetylene torch was used in making the weld, did the heat of the flame make the axle brittle at that point? If the electric process was employed, what additional metal was used in making the weld?

Perhaps some readers have used other means than welding for securing split gears on an axle that was too small for them and will be willing to tell how it was accomplished and with what success. I shall be glad of any information along this line.

_____, W. Va.

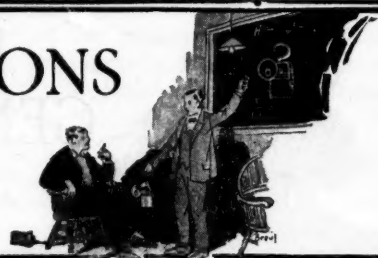
MINE MECHANIC.

Although the process of electric welding, now so widely used, is comparatively new in mining practice, *Coal Age* is sure that some of its readers will be able to give the results of their experience in work similar to that described by this correspondent, and we hope for a generous response.



EXAMINATION QUESTIONS

ANSWERED BY
JAMES T. BEARD



Mine Managers' Examination, Springfield, Ill., April 8, 1919

(Selected Questions)

Ques.—What will be the diameter of an upcast shaft necessary to pass 200,000 cu.ft. per min., with a velocity of 500 ft. per minute?

Ans.—The sectional area of this shaft is $200,000 \div 500 = 400$ sq.ft. Since the cross-section is a circle its diameter is $d = \sqrt{400/0.7854} = 22.57$, say 22 ft. 7 in.

Ques.—A return airway is 10 ft. wide and 5 ft. high, and the velocity 600 ft. per min. The air is composed by volume as follows: Nitrogen, 79 per cent.; oxygen, 20.96 per cent.; carbide dioxide, 0.04 per cent. Find the number of cubic feet of each gas passing in this airway per minute.

Ans.—The sectional area of the airway is $5 \times 10 = 50$ sq.ft., and the volume of air passing, $50 \times 600 = 30,000$ cu.ft. per min. Therefore, the volume of nitrogen in the air current is $30,000 \times 0.79 = 23,700$ cu.ft.; the volume of oxygen, $30,000 \times 0.2096 = 6288$ cu.ft.; and the volume of carbon dioxide, $30,000 \times 0.0004 = 12$ cu.ft.

Ques.—Taking the weight of a cubic foot of air at 0.086 lb., what will be the weight of the air in a shaft 15 ft. in diameter and 250 yd. deep?

Ans.—The sectional area of a shaft 15 ft. in diameter is $0.7854 \times 15^2 = 176.715$ sq.ft. The volume of air filling this shaft, or the cubic contents of the shaft for a depth of $3 \times 250 = 750$ ft., is $750 \times 176.715 = 132,536+$ cu.ft., and the weight of this air is $132,536 \times 0.086 = 11,398+$ lb.

Ques.—A pillar of coal 450 ft. long and 132 ft. wide has been worked. The total weight of the coal is found to be 12,430 tons and its specific gravity 1.25. What was the thickness of the seam?

Ans.—A horizontal section taken through this pillar has an area of $450 \times 132 = 59,400$ sq.ft. The weight of a cu.ft. of coal having a specific gravity of 1.25 is $1.25 \times 62.5 = 78.125$ lb. Again, the cubic contents of 12,430 short tons of this coal is, therefore, $(12,430 \times 2000) \div 78.125 = 318,208$ cu.ft. Finally, the thickness of the coal in this pillar is $318,208 \div 59,400 = 5.35$ ft.; or 5 ft. 4½ in.

Ques.—Find the length of a dumb drift, which is driven from a level, starting 240 ft. from the shaft, and which enters the shaft 100 ft. above the level.

Ans.—This is the dumb drift formerly used in the ventilation of a mine generating some gas and where the ventilation is produced by a furnace. The return air current, charged with gas, passed through the drift and entered the shaft at a point where there was less danger of the gas being ignited by the heat or by sparks from the furnace. The arrangement is seldom

found in coal mining, today. The dumb drift represents the hypotenuse of a right triangle whose respective sides are 240 and 100 ft. in length. Therefore, the length of the drift is $\sqrt{100^2 + 240^2} = 260$ ft.

Ques.—(a) Name the gases found in the coal mines of this state. (b) Tell which gas is the most difficult to remove. (c) Which are explosive and which are non-explosive? (d) Give their chemical symbols.

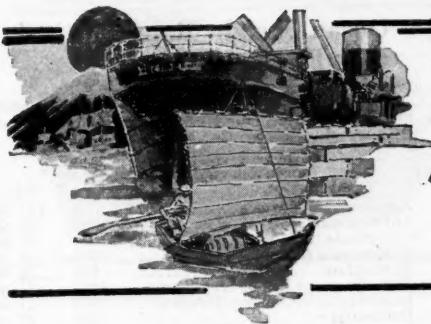
Ans.—(a) The common mine gases found in the mines of Illinois are methane or marsh gas; carbon dioxide; carbon monoxide; hydrogen sulphide and possibly, associated with methane, the heavy hydrocarbon gases, olefiant gas and ethane. The nitrogen and oxygen of the air are always present. (b) Probably the most difficult gas to remove is carbon dioxide when accumulated at the face of a dip heading or in dip workings. Methane, accumulated at the face of a pitch, is also difficult of removal, but less so than carbon dioxide in the dip, owing to the lesser density of the methane. (c) Of the gases named, those that are explosive when mixed with air in proper proportion are methane, carbon monoxide, hydrogen sulphide and the two heavy hydrocarbon gases mentioned. The non-explosive gases of those mentioned are carbon dioxide and nitrogen. (d) The symbols of the gases mentioned in the order given are CH_4 , CO_2 , CO , H_2S , C_2H_6 , N_2 and O_2 .

Ques.—What is the real object of artificial respiration?

Ans.—The object of artificial respiration is to restore the action of breathing, by alternately and mechanically contracting and expanding the lungs, thereby expelling the noxious gases or water from the lungs and causing the inhalation of pure air.

Ques.—If an airtight stopping be erected in the main return airway, at a point 100 ft. from the fan, what effect will be produced on the fan?

Ans.—The placing of an airtight stopping in the main return airway will block the further passage of air. The result is that the air will simply be churned within the fan and no current produced. The effect in the fan drift, outby from the stopping, is to increase the pressure to what is called the "static pressure" due to the fan. The static pressure due to a fan's action may be calculated, by multiplying the actual pressure produced by that fan when running at the same speed and discharging into the unobstructed fan drift, by the ratio of twice the acceleration due to gravity (64.32 ft. per sec.), to the velocity (ft. per sec.) of the air in the unobstructed airway. In other words, the ratio of the static pressure to the actual pressure produced when a centrifugal fan is discharging into an unobstructed airway is equal to the ratio of twice the acceleration due to gravity, to the velocity of the air current that would be generated in the unobstructed airway, by the fan running at the given speed.



FOREIGN MARKETS AND EXPORT NEWS

EDITED BY ALEX MOSS



Suggests That American and English Coal Operators and Shippers Combine

C. B. Wynkoop, President of Cosgrove & Wynkoop, Believes It Would Be to the Mutual Interest of American and English Coalmen to Get Together—Foreigners Need Coal

C. B. WYNKOOP, president of Cosgrove & Wynkoop, Ltd., of 149 Broadway, New York City, who recently returned from a six weeks' tour of Europe, where he went to look into coal-market conditions, believes it would be advantageous to all producers and shippers of American and English coals if they would get together under a sort of working agreement, as a result of which there would no longer be any obnoxious fighting between the coalmen of America and England. Mr. Wynkoop has reached this conclusion after an exhaustive study of the situation as it affects mine owners in both countries.

Mr. Wynkoop returns to America convinced that there is a big market for American coal on the other side of the Atlantic. France and Italy, he says, are in dire straits for lack of coal, and the Italian railroads are burning anything that is burnable in order to move their trains, the fuel consisting largely of the bark of trees and the smaller limbs, the trunks being used for building purposes.

"England," said Mr. Wynkoop, "is not producing coal enough to meet its own requirements, to say nothing of shipping it to outside markets. The producers are trying to hang on to the export trade but are finding it extremely hard. Their own domestic requirements are taking as much coal as they can produce. So long as these conditions exist (and it will take between three and four years for mining to become anything like it was under prewar conditions) there is a big field for American coals in foreign countries heretofore supplied by the English. By that time our coal ought to be so well established in these foreign markets as to make it exceedingly hard for Americans to lose the trade."

"To my surprise I found that the English, instead of objecting seriously to an invasion of their markets by Americans, are anxious to make friends with the American coalman."

"The conditions in Italy are extremely bad. American coals have been well received, and I heard nothing but good reports about their burning qualities. If we Americans do the right thing I think the chances for permanent business are good; and there is plenty of business to be obtained."

"There is a big market for the coals of the United States all through the Mediterranean, but it must not be forgotten that consumers there have a lot of confidence in the English and will expect the same treatment from the American coalman."

Mr. Wynkoop is firmly of the belief that if American coals once get established in foreign lands and the coalmen wake up to the situation English shippers will not be able to recover the business. One thing will be necessary, however, he declared, and that is that the American coalman revise his methods of doing business.

Mr. Wynkoop spoke of the necessity of living up to contracts, which a great many in this country regard as "mere scraps of paper." In America, he said, one party tried to make it as hard as possible for the other party to the contract and frequently is able to squirm out of the agreement by the slightest excuse; in other words, the contract is regarded loosely. In foreign countries a contract is regarded as a solemn pledge.

Comparing the quality of American

coals with those of England, Mr. Wynkoop believes that Pocahontas or New River coals are equal to anything that England produces, although the opinion might be contrary to the analyses. He said these two grades of American coals were now doing the heavy work in some foreign countries better than it was being done by the best grades of English coals, and that they had already made a market for themselves.

Another departure advocated by Mr. Wynkoop is that every coal-selling company in this country send a salesman to Europe to become acquainted with the trade and to learn their methods of doing business. The method of salesmanship, he says, is entirely different from that employed here. The English salesman is not as aggressive as his American brother, and even in these strenuous days finds time to take his afternoon tea and a frequent holiday.

The Southern American trade, Mr. Wynkoop declared, should belong to Americans. He said the English were badly frightened over the fact that that market is gradually but surely getting away from them, and that the prospects of their ever being able to regain it are becoming more remote every day. But, he declared, Americans must be careful as to the quality of coal they send to these South American countries if they wish to retain those markets. Consumers there are familiar only with the best the market affords and will insist upon receiving the same grades from the United States. Then it should also be remembered, added Mr. Wynkoop, that America will take comparatively little of the products of South America in return for its coal, while England is dependent upon these countries for much of its grain and hides.

Export Association to Assist Foreign Buyers

Arrangements have been made by the American Manufacturers' Export Association whereby introduction cards will be placed in the hands of foreign buyers about to visit this country. These cards, properly signed by representatives of the United States Government abroad, banks, chambers of commerce and the representative of the Export Association in foreign lands, will serve to accredit visiting buyers to the New York office of the Export Association. Buyers seeking particular kinds of merchandise will thus be aided by the association in getting in touch with American manufacturers producing the kind of goods desired. This will result in putting foreign purchasers in direct touch with American exporters.

The *Deutsche Allgemeine Zeitung* learns that a new coal agreement has been concluded between Germany and Switzerland, effective as from June 1, for the delivery of 30,000 tons of coke and 20,000 tons of coal per month for a period of six months. It is probable that a further 12,000 tons of brown coal briquets will also be delivered. The figures given refer exclusively to fuel from the Ruhr district. On the basis of the intended delivery distribution the price of fuel to be supplied works out on an average of about 105 fr. per ton.

Forbids Export of British Coal to Marseilles

The coal firms at Marseilles have taken exception to the action of the Ministry of Shipping in London, who refused to sanction the export of any more coal to Marseilles in British ships, owing to information having reached them that coal intended for Marseilles has been re-exported, at very high prices, to Italy and Roumania. After carefully looking into the matter the president of the British Chamber of Commerce at that port decided to send a protest to H.M. Consul-General at Marseilles, from which the following is an extract:

"This matter being of urgent importance to British interests here, I have brought it before my council and also before our Coal Advisory Committee, and the council are of opinion that the action of the Ministry of Shipping was not justified on the facts at present known, and that it is urgently necessary that the decision of the Ministry of Shipping be reconsidered without delay. After careful examination this Chamber is unable to trace any justification for the charges mentioned, and would be very glad, if desired, to investigate any such charges upon receipt of further detail. I trust that a solution may soon be found, as it is obviously extremely hard on the many British and French firms engaged in this trade that they should be penalized in this way, and if an offender exists it would presumably be sufficient to blacklist that offender."

High Wages Paid to English Coal Trimmers

Shipowners have been called upon to face unusually heavy bills for trimming coal at the South Wales ports, remarks the *Liverpool Journal of Commerce*. Recently a case has occurred in which a gang of Cardiff coal trimmers received £16 per man for five days' work at the present limited hours, and another case is recorded in which each man drew £4 for three hours' work. A demand made by the South Wales coal trimmers for a further 20 per cent. increase has been rejected by the Trimming Board. Only recently an agreement was arrived at whereby the employers gave an extra 20 per cent. increase in wages, making their total earnings 116 per cent. above prewar wages.

South Wales coal trimmers' earnings, comments the *Nautical Gazette*, therefore are above the remuneration of many professional men. There is, however, no possibility of any great influx of labor to coal trimming, inasmuch as it is not possible, it is understood, to become a coal trimmer without the consent of the Coal Trimmers' Union, the qualification being that the applicant's father must be a coal trimmer.

The War Trade Board announced on June 27 that shipments of coal may now be made from all ports on the Atlantic seaboard, and that the collectors of customs have been notified to disregard the provision contained in export licenses already issued to the effect that shipment must be made from Philadelphia or ports south thereof.

Market for Coal in Pernambuco

The coals used for bunkering steamships, reports Consul A. T. Haerberle, Pernambuco, Brazil, under date of Mar. 9, 1919, are Pocahontas and New River from the United States and North Country from England. Cardiff coal has not been shipped into Pernambuco for some time, although it is preferred for bunkering purposes, and no doubt when things are normal it will be imported again to a great extent. Recently the average price of coal, either gas

or steam coal, has been about £8 10s. (\$41.36) per ton, but there is every reason to believe it will be reduced considerably within a short period.

The gas works in Pernambuco are managed by the tramways, and they have been receiving coal from Lancashire, although in June last year a shipment came from Newport News. The price of American coal alongside quay was practically that given above. The gas company is said to consume a great deal of wood in gas production. The tramways have been generating their power from wood for some time, and until coal returns to a normal figure they will probably continue to do so.

The local rate for unloading a steamer with the use of winches and winchmen is 2 milreis (50 cents United States currency) per ton, and that for a sailer varies between 2 and 3 milreis, according to facilities offered by the ship's gear, as there are times when the master of a sailer refuses to allow the use of the winch. In any case, the price for the latter can be reckoned at 3 milreis.

The import duty on coal at present is 2 per cent. on a fixed value of 20 milreis per ton. The customs authorities are endeavoring to base the duty on the invoice value, but up to the present no change has been made. There is also 1 milreis per ton paid by the ship to the port works as a conservancy tax, and another tax of 4 milreis per ton, which is, for the present, in abeyance, as the port authorities can not collect this latter amount until an official coal depot is made by the port works.

American Coal for France

The French Government is arranging to import 1,000,000 tons of coal from the United States, and will employ a special fleet of ships for the purpose. Louis Loucheur, Minister of Reconstruction, said in the Chamber of Deputies recently that while France might not be able to face the coming winter without misgivings regarding the fuel supply, she would be able to tide over the coal crisis, which, he added, is worldwide.

Great Britain, which exported 80,000,000 tons of coal a year before the war, he remarked, has reduced her sales abroad to 40,000,000 tons, and will perhaps shut off exportation altogether. He continued by saying that France must rely on Germany for 20,000,000 tons of coal annually, to replace the diminished production in the north of France, and 7,000,000 tons in addition, which France imported from Germany each year before the war.

Coal Production of Dutch East Indies

According to the Dutch East Indian Archipelago, the consumption of coal in the Dutch East Indies has increased from 600,000 tons for the year 1914 to 1,000,000 tons in 1918. Before the war about 400,000 tons were imported from Australia and Japan, a considerable portion of it being for state railways, which in 1915 consumed more than 150,000 tons of foreign coal.

The scarcity of tonnage on the usual

trade routes was the direct cause of the increase in the use of home coal. It is possible that Australian and Japanese coal will again find a market in Java and the outer possessions, as boats from those two countries coming to the Dutch East Indies for raw materials will bring coal as ballast. Moreover, it is possible that Indian coal may find a market in Singapore and Padang, which import about 1,000,000 tons from Australia, Japan and British India.

The chief sources of supply of Indian coal are the Ombilin mines, situated near Padang, Sumatra, and the mines of Pulo Laut, a small island lying off the southeast coast of Borneo, both areas being worked by the Government. The Ombilin mines are by far the more important, producing about 480,000 tons in 1917 and 470,000 tons in 1918. The Pulo Laut mines average 120,000 tons a year. Private mining companies produce about 110,000 tons a year. The output of the Lemantang area, Sumatra, is expected to reach fully 200,000 tons, and an endeavor will be made to increase this by about 20,000 tons each year. There is a coal area at Tandjoeng, Sumatra, which, it is claimed, yields good steam coal; in fact, it is considered the best produced in the colonies. The Government proposes to develop this district.

The port of delivery of the Ombilin coal is Emmahaven, the port of Padang. It is connected with the coal mines by a railway about 95 miles long, a part, owing to the very hilly country, being constructed on the cogwheel system. The Government has constructed all modern appliances at Emmahaven for the quick dispatch of coal.

The Ombilin fields extend for 10 kilometers (6.2 miles) and have a breadth of 9 kilometers (5.6 miles). The seams are usually very thick, some being 23 meters (75 ft.). The mines are generally worked by tunnels, and all modern equipment is employed. The supply is estimated at 200,000,000 metric tons of coal, and about 7,000,000 tons have been extracted from 1892 to date.

Department of State Takes Over Activities of War Trade Board

The Department of State and the War Trade Board announce that, pursuant to an executive order signed by the President on May 12, 1919, the present personnel, duties, powers, functions and records of the War Trade Board have been transferred to the Department of State as of July 1, 1919.

This transfer will not affect nor inconvenience the exporting and importing public in any way. All licenses heretofore issued by the War Trade Board will continue to be valid except licenses for the exportation or importation of wheat and wheat flour.

The functions of the War Trade Board thus transferred to the Department of State will continue to be performed by the present personnel of the War Trade Board in the War Trade Board building at Twentieth and C Sts., Washington, D. C.

All licenses will continue to be issued in the name of the War Trade Board, and all applications for licenses, and all correspondence pertaining to the activities of the War Trade Board, now assumed by the Department of State, should be addressed to the War Trade Board as heretofore.

Ocean Freight Rates on Coal From United States

The United States Shipping Board's rates on export coal to European ports are as follows per gross ton:

To	Daily Discharge,*	
	Tons	Rate
Bordeaux and Havre.....	700	\$22.50
Antwerp and Rotterdam.....	1000	22.50
Christiania.....	1000	27.00
Gothenburg (Sweden).....	1000	26.50
Helsingfors.....	800	30.00
Copenhagen or Rone (Denmark)...	1000	27.00
Landskrona or Malmö (Sweden)...	1000	27.00
Oxelösund.....	1000	28.00
Stockholm.....	1500	28.00
Marseilles.....	1000	26.00
Spanish Mediterranean ports.....	1000	26.00
Genoa.....	1000	26.50
Leghorn.....	700	26.50
Naples.....	1000	26.00
Trieste, Fiume or Venice.....	800	31.00
Patras and Piræus.....	700	28.50
St. Nazaire.....	700	22.50
Cherbourg.....	700	22.50
Rouen.....	1000	23.00
Ternewen.....	1000	22.50
Helsingfors, Sundsvall.....	800	30.00
Bergen, Christiania.....	1000	27.00
Korsör.....	1000	27.00
Trondhjem.....	1000	28.00
Lisbon.....	1000	22.50
Cadix.....	1000	23.50
Bilboa, Cartagena, Barcelona.....	1000	26.00
Cette.....	1000	26.00
Civitavecchia.....	1000	26.00
Nice, Leghorn, Spezia, Savona.....	1000	26.50
Piræus.....	1000	28.50
Salonica.....	1000	31.00
Bari.....	1000	30.00
Constantinople, Constanza, Smyrna	1000	31.00
Algiers, Oran.....	800	26.00
Tunis.....	1000	26.50
Sfax.....	1000	27.50
Alexandria, Port Said.....	1000	31.00

* Discharge is as indicated in the tabulation, with time counting 24 hours, after arrival of vessel, whether in berth or not, Sundays and holidays only excepted. If discharge is not completed within the time specified demurrage is to be paid at the rate of \$1.00 per net registered ton per running day, payable day by day.

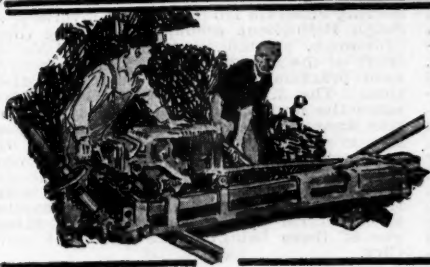
Coal and Coke Exports from New York in May, 1919

The exports of coal and coke through the Port of New York during May of this year were the smallest in three years, those of 1917 and 1918 exceeding them both in tonnage and value, although the average price per ton this year was larger than the previous years, with the exception of coke in 1917.

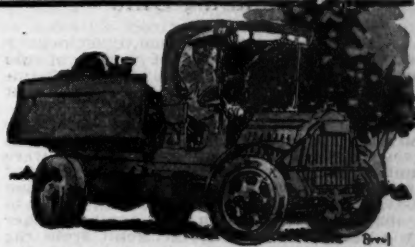
But three countries received bituminous coal through New York during May of this year, a decrease of two countries when compared with either of the two previous years. Fourteen countries received shipments of anthracite through this port in 1917 as compared with five countries in 1918 and seven this year.

Comparison of tonnages and values for the three years is shown in the following tabulation:

	Anthracite		1919		Bituminous		1919		Coke		1919	
	1917	1918	1917	1918	1917	1918	1917	1918	1917	1918	1917	1918
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Argentina.....	22	\$375										
Barbados.....					23	\$215						
Bermuda.....			50	\$500								
Brazil.....	168	1,597	482	3,736	352	2,376						
British Guiana.....					5	80					4	\$100
Canada.....	10,621	83,844	3,341	21,627	2,431	20,232	10	\$33				
Chile.....	391	6,118							1,258	25,899		1,120
Colombia.....	9	145			1	20						
Costa Rica.....	5	75							8	200		
Cuba.....	1396	7,000	70	1,080			4	60				
Danish West Indies.....									12	258	17	404
Dutch East Indies.....									120	3,800		
Ecuador.....	25	400									25	700
France.....										1,540	15,000	405
French W. I.....									21	472	17	393
Guatemala.....												3
Haiti.....	50	725					50	700				105
Italy.....												
Jamaica.....	2	27										
Mexico.....	69	443					60	600				
Newfoundland.....	1,645	14,128	501	3,215	200	1,670	195	2,067	213	2,241		90
Panama.....									240	4,789	208	6,231
Peru.....										60	1,560	27
Portugal.....												
San Domingo.....	2,301	18,128			589	4,809	646	4,644	1	22	15	280
Trinidad.....							285	1,710	20	345		485
Venezuela.....	10	150										30
Total.....	16,714	\$133,327	4,444	\$30,158	3,601	\$29,402	995	\$7,147	1,900	\$38,063	2,153	\$30,868
Av. cost per ton.....		\$7.97+		\$6.78+		\$8.16+		\$7.19+		\$20.03+		\$14.33+



COAL AND COKE NEWS



Harrisburg, Penn.

The bill presented by Senator Crow of Fayette County, granting the right and lawful authority to corporations to construct and operate tunnels under the bed of navigable streams where necessary to reach their coal supply, subject to the approval of the Water Supply Commission, is in the hands of the Governor.

This bill went through the Legislature without much noise, and provides that from and after the passage of the act, that where any power or manufacturing plant of any company heretofore or hereafter incorporated under the laws of Pennsylvania is situated upon or near the bank of any navigable stream, and such company has the right, either as the owner in fee or by lease, to mine coal from or under lands adjoining or adjacent to the opposite bank, then the company shall have the right and lawful authority to construct, operate and maintain tunnels under such a navigable stream so as to connect its coal lands and any mine operated in connection with such coal lands with a power plant of the company, provided, before any company begins the construction of any tunnel, it shall make application to and secure the approval of the Water Supply Commission of Pennsylvania. The bill also provides that the corporation constructing such a tunnel shall pay to the State of Pennsylvania the fair market value for all coal mined in constructing such a tunnel.

Charleston, W. Va.

While the same conditions did not apply in other parts of the state, yet in this section under improved transportation conditions, mines were able to get out more coal during the last week of June than at any time during that month, which has so far proved to be the best of the calendar year; although floods in one or two sections of the Kanawha Valley virtually marooned all mines on certain railroads for a period of three or four days, so that no coal whatsoever was shipped. However, traffic on trunk lines operating in this territory was not affected. Careful inquiry in the producing fields of this section elicits the information, that there was during the last week of June at least a ten per cent. increase in the output mainly due to the fact that more cars were furnished the mines than at any time in the month; other districts, however, did not fare quite so well.

While production in general has not reached its maximum, the trend is rapidly tending in that direction in West Virginia, at least in so far as market conditions are concerned; local conditions are mainly responsible for holding back production and in some sections in this part of the state the output now equals about 85 per cent. of capacity. Labor gives the impression of becoming scarcer each succeeding week in the face of a more plentiful car supply, which gives the mines larger opportunities for work. The demand for all kinds of coal was most pronounced in West Virginia at the beginning of July, especially as to smokeless, most of which is said to be under contract. In fact smokeless producers claim that fully 90 per cent. of the output of smokeless regions is under contract now.

Gas and splint coal mine-run are also finding a much readier market than was the case even by the middle of June. Although there is room for improvement as to steam coal, still with industrial consumers, under the necessity of restocking and making provision for future needs, even that coal is showing greater activity. Eastern markets on the whole are using by far the largest proportion of West Virginia coal, although Western markets are also showing increased activity. Tidewater shipments during the week ended June 28 were unusually heavy, indicating a marked growth in the export demand. As the demand becomes stiffer, prices on all

kinds of West Virginia coal are also moving upward. As one West Virginia operator puts it, it is more a question of getting coal loaded than of selling it.

Production in the New River field was unusually heavy at the end of June, an excellent car supply enabling the mines to run continuously throughout the week. A number of companies had about a 100 per cent. supply of cars, though the general average was somewhat lower than that. The return of a certain number of mine workers to the field has also made it possible to produce more coal in the district, though in general miners are still hard to secure and for that reason there is not a full production. As was the case earlier in June the greater part of New River tonnage was being moved to tidewater and general Eastern markets for bunkering and export, although the Navy was a heavy consumer of New River coal. The demand for mine-run smokeless was becoming heavier and consequently there was an increase in the price, the average quotation for mine-run being \$3.25 a ton. Prepared sizes ranged in price from \$3.50 to \$4.00 a ton. With mine-run in heavier demand it was found easier to move stock.

By the end of June the mines of the Kanawha district had almost succeeded in reaching a production as high as that attained during most of the time in 1918; the output during the last week of June being approximately 75 per cent. of full time capacity; total production was close to 190,000 tons, an increase of about 10 or 15 per cent. over the previous week. It was largely through a better car supply that such results were secured. Inquiries for all kinds of coal were much heavier. It was apparent in fact that market conditions were still becoming more favorable. That was true at least as to splint and gas mine-run, the demand for which in the East has become sustained, much of such coal being consigned to tidewater. While the sales of steam coal were larger than during previous weeks, such coals were not quite as active as others. A surprisingly large amount of Kanawha coal is being shipped eastward, although usually the markets for Kanawha coal have been in the West rather than the East. The last week in June found an additional number of companies with their product under contract. Contract mine-run had reached a price of from \$2.25 to \$2.35, while mine-run spot was averaging \$2.25. Prepared sizes advanced in price from about \$3.00 to \$3.25 a ton.

Huntington, W. Va.

Further gains were scored in the production of coal in the Logan mining district during the week ended June 28, the total output being 237,759 tons, as compared with 232,129 tons for the previous week. There was an output of 237,708 tons during the corresponding period of last year. There was a very slight increase in the car shortage loss during the week, lack of cars still affecting production to the extent of 30,859 tons or about 10 per cent. of capacity. This was offset, however, by a somewhat improved market, only 23,776 tons being lost because of no market. Mine workers were somewhat more scarce, the percentage of loss from labor shortage being almost 3 per cent. or 8593 tons as against 2722 for the previous week. The output now amounts to 76 per cent. of capacity.

It became necessary on July 3 to place an embargo on Lake shipments, according to a notice received by operators of the Guyan Valley, owing to an accumulation of Lake coal on port roads; also owing to the small number of vessels available, an embargo was imposed on the loading of all Lake coal to Toledo, covering a period of 72 hrs. or up until July 6. Between the embargo and the fact that so many miners were helping to bury John Barleycorn as well as to celebrate Independence Day, production probably slumped to 50 per cent. during the first five days of July.

Another gain in Chesapeake & Ohio Ry. coal loading was revealed in the official figures issued at the local offices. Five hundred more cars were loaded in June, 1919, than in June, 1918, a month when war production was at a high level.

Fairmont, W. Va.

Dents were made in the production of the Fairmont and other northern West Virginia fields, served by the Baltimore & Ohio, during the last ten days of June, by a quite acute car shortage which, while generally anticipated, was not expected so soon. The fact that there were a surplus number of cars on hand, owing to the heavy car supply of earlier weeks, was all that prevented a general suspension or at least a limitation of operations throughout northern West Virginia fields. As it was 25 companies were affected in the Fairmont district proper for a day or so, there being only about 500 cars furnished along toward the middle of the last week of the month as against a requirement of about 900. There was no improvement as to Lake shipments. Producers ascribe the limited tonnage moving to the Lakes from northern West Virginia fields as being due largely to rate discrimination. The tonnage moving Lakeward was even less than during the week ended June 21; while on the contrary shipments to tidewater were somewhat heavier. There was an enlarged demand for railroad fuel apparent during the week. While Western tonnage has been running rather light, the loss has been more than compensated for by a gain in Eastern business. It also became apparent that industrial consumers were buying more coal.

Bluefield, W. Va.

There was a complete recovery in the Pocahontas district during the week ended June 28 from the production slump of the previous week, production reaching the highest point in recent months, 336,695 tons, as against 156,000 tons for the previous week, a gain of 140,000 tons. Such recovery was made possible entirely because of a most marked improvement in car service, the loss from a shortage of cars being reduced from 263,000 to 37,105 tons, a difference of 225,000 tons alone in that respect. There would have been an even larger gain in production but for the fact that the labor shortage loss jumped from 791 tons to 10,467 tons and mine disability from 1945 tons to 10,332 tons. As it was, however, the total production loss was cut down from 265,000 tons to 58,215 tons, a gain of 207,000 tons. That Pocahontas coal, in addition to the extremely large tonnage under contract for the coal year, is being sold as fast as mined is shown by the fact that there was no loss whatsoever from "no market." The demand for export coal from this field has become quite heavy and prices are showing further tendencies to advance. In most markets Pocahontas prepared is selling from \$4.50 a ton upward. Coke production is still around 7000 tons.

A gain of 23,000 tons was made in the Kenova-Thacker district during the week ended June 28, production being 110,897 tons as against 77,738 tons for the previous week; there was a production of 140,624 tons for the same period of 1918. In short the mines of this district were producing up to about 62 per cent. of capacity; the loss in output was 65,497 tons, with a car shortage loss of 15 per cent. amounting to 28,897 tons, that being a reduction, however, of 38,000 tons. There was also a larger market for Kenova-Thacker coal as shown by the fact that the loss from no market was reduced to the extent of 13,000 tons. It is believed that production for the first week of July will show a decrease owing to the fact that miners in many instances spent most of the week on an Independence Day vacation.

Columbus, Ohio

On June 26 Jerome Watson, chief deputy and safety commissioner of mines, of the state of Ohio, sent the following communication to the operators and miners of that commonwealth:

"The recent terrible disaster which occurred at Wilkes-Barre, Penn., in which the lives of approximately 100 men were snuffed out in an instant, as the result of an explosion of powder which was being conveyed into the mine in a car attached to a man-trip, and which was ignited either by a spark or by a short circuit from the electric wires which were carried along the entry, has prompted the Mining Department of Ohio to call your attention to the following section of the mining laws relating to the conveying of explosives into the mines of our state:

"Section 962. (Conveying of Explosives) 'Blasting powder or explosives must not be taken into or out of a mine, or moved from place to place in a mine along any entry or haulway where there are electric wires, while the power is on such wires, except when such powder or explosive is conveyed in insulated cars or packages.'

"In connection with the following the Mining Department hereby issues the following order, effective at once: That no powder or other explosives be conveyed, transported or taken into or out of any mine in this state, on any trip in which men are being hauled to and from their working places, and only those whose duties so require shall ride on, or in any car containing powder or other explosives.

"The purpose of the above order is to eliminate the danger of an accident of a like nature occurring in any of the mines of our state. We all know that had such a rule been enforced at this ill-fated mine at Wilkes-Barre, all of the horrors and suffering that attended this disaster would have been averted, and those men who suffered and died would have been alive today. The Mining Department will insist upon this order being complied with and expects your cooperation in the enforcement of same."

A similar law is operative in Illinois as regards shutting off the electric power on wires when explosives are being moved in proximity to current conductors in the mines.

Ottawa, Ont.

As the result of an investigation by a Committee of the Senate into the granting of certain valuable coal leases in the Smoky River district of the Alberta Peace River to Colonel A. T. Shillington and C. A. Barnard, the leases have been cancelled by the Canadian Government. The lessees had made application for the right to build a railway to be known as the Athabasca, Grand Prairie & Vermilion Ry. for the development of their property, and when the matter came up in the Senate, objection was raised on the ground of reports concerning the manner in which the leases had been secured. An investigation disclosed the fact that the lands were originally leased to Dr. Hoppe, a German-American, in 1912, at an annual rental of \$1 per acre for 13,300 acres. He made default in his payments in 1918, and on Aug. 3 of that year the lease was cancelled. Dr. Hoppe and associates had spent some \$200,000 in exploration and mining work, proving the valuable nature of the deposit. Shillington and Barnard somehow obtained inside information to this effect before the cancellation of the lease to Dr. Hoppe, and parties acting in their interests proceeded to stake the claims on the first opportunity. D. B. Dowling, of the Canadian Geological Survey, testified that the area is probably the most valuable of its kind in Canada and estimates the coal content at 400,000,000 tons of semi-anthracite coal, superior in grade to any other of that kind in the Dominion. It is not charged that there was anything absolutely illegal in the second staking, the ground on which the leases were cancelled being that property known to be enormously valuable should not be handed over to private individuals for exploitation.

Victoria, B. C.

Amendments to the Coal Mines Regulation Act introduced at the last session of the Provincial Legislature by the Hon. Wm. Sloan, minister of mines, came into effect on July 1. Henry Miard, of Coal Creek, B. C., and James Dixon, of Nanaimo, B. C., are the examiners appointed under this act. Since 1911 Mr. Miard has been the miners' representative on the retiring Board of Examiners. He has worked in

the coal mines of the Crow's Nest Pass field for nearly 20 years, holding official positions for some 10 years. James Dixon is mine manager at the Reserve mine operated by the Western Fuel Co. at Nanaimo, B. C. He has been appraiser for the Board of Examiners of British Columbia, examining the papers of candidates for certificates of competency. Messrs. Miard and Dixon will act in a dual capacity. First, they are members with the Chief Inspector of Mines as chairman of the Board of Examiners charged with the examination of candidates for certificates of competency as coal mine officials. Secondly, they are members, with the inspectors of mines of the various districts as chairmen, of the board for the examination of candidates for certificates of competency as coal miners. Mr. Sloan explains that there is really only one board—a Central Board superseding the top-heavy machinery which has existed permitting the reduction of the personnel of the Examining Administration from 33 to 3, and enabling the Government to dispense with the services of 27 officials. At the same time it will result in much increased efficiency.

It is pointed out that the formation of this Central Board will remove the difficulties encountered by the nine boards of examiners for the examination of coal miners and the one board for the examination of coal mine officials. The representatives of these boards often have been unable to attend board meetings. Moreover traveling expenses of those coming from a distance did not reimburse for loss of time which trips from various parts of the province to the coast entailed. The result was that the board often found it difficult to obtain a quorum. Furthermore, high priced outside parties prepared examination papers and examined the answers of candidates. The board then forwarded the results to the Minister of Mines, Wm. Sloan; when considering reorganization much of this procedure was considered useless, besides having the effect of leaving functions of vital importance in the hands of a few. Under the new arrangement the two examiners just appointed, with the Chief Inspector of Mines as their chairman, will conduct examinations of candidates for certificates of competency as officials in coal mines, wherever it may be most convenient to all concerned.

If the old system of examination had been continued it would have been necessary to continue adding to the boards of examiners. Under the unamended Coal Mines Regulation Act most of the collieries had their own boards for the examination of men. This arrangement was satisfactory so long as there were only a few operating mines in the province. Conditions, however, are changed; there now are a considerable number of small collieries and, if each of these was given a board there might be almost as many members of examining boards as there are miners coming up for examination monthly.

The problems noted will be completely met by the new Central Board. Instead of the men going to the board, the board will go to them. It will travel from one coal mining district to another at regular intervals. The new method will have the effect of setting a standard of knowledge among all underground workers in coal mines throughout the province. It will obviate the present difficulty of too much board representation at one point and too little at another. Another important point is that no man will be recognized as a coal miner for a temporary period pending his examination. In this connection Mr. Sloan maintains that it is a manifest absurdity to allow an uncertificated man to assume the responsibilities of a miner for 30 days without his knowledge being tested, it being possible for an incompetent person in that period to endanger not only his own life, but that of hundreds of others.

PENNSYLVANIA

Anthracite

Audenried—The C. M. Dodson Co., of this place, has installed an electric hoist and pump at its Beaver Brook colliery, thus doing away with the services of a number of men employed at a steam plant.

Pottsville—The Middle Creek colliery, one of the old operations of Schuylkill County, is again to be placed in operation and seams of coal heretofore untouched will now be mined. There were large culm banks left at this colliery when its operations were discontinued a number of years ago, and these banks proved exceedingly valuable. All this coal has now been marketed, the banks having been cleaned up. It is expected that more than 600 men and boys will find employment in the reopening of the colliery.

Hazleton—A large group of mining engineering students from Lehigh University, at South Bethlehem, among them being three Chinamen, started to work in the No. 40 shaft of the Lehigh Valley Coal Co. here to gain practical experience during vacation time. The J. S. Wentz Coal Co. will resume the first aid contests this summer. It was announced on July 1. These competitive events, among teams representing the various collieries of this company, were abandoned during the war owing to the great demand for fuel. The best teams from every mine will be brought together at a central point to compete for prizes, one of these being a free trip to Atlantic City.

Bituminous

Clymer—The Estep brothers, of the Estep Brothers Coal Mining Co., Inc., and the Milbar Coal Co. have purchased several large tracts of coal near Diamondville. Diamond-drill test holes have been completed and work has already been started on the new opening. The siding will be connected with the joint Cherry Tree branch of the New York Central and the Pennsylvania railroads.

Brownsville—The coke business in the Connellsville region continues to improve. The H. C. Frick Coke Co. is following out its program of firing 1,000 beehive ovens, distributed among its various plants. The Republic Iron and Steel Co. is firing 300 ovens at Republic, making 350 in blast at that point. The Thompson-Connellsville Coke Co. is firing 50 ovens each at its No. 1 and No. 2 plants. The W. J. Rainey company is showing increased activity at its various operations. Also the Snowdon Coke Co. is firing 60 ovens at its plant near Brownsville, making 210 in blast at that plant.

WEST VIRGINIA

Keystone—The large steel tippie recently completed by the Keystone Coal and Coke Co. at this place has been put in operation. This company makes an annual shipment of over 400,000 tons of Pocahontas coal.

Charleston—Having spent several months in sinking a shaft and in building an up-to-date plant on Campbell's Creek, the Columbia Coal Co. began shipping from its new plant during the week ending June 21 and is now getting out quite a fair tonnage.

Charleston—On June 26 the newly created Department of Public Safety became a reality, Lieutenant-Colonel Jackson Arnold of Weston having been appointed as the head of the department. He is now at work selecting the members of the force which may have a total maximum strength of 110 privates.

Ward—Extensive improvements are under way at the mines of the Kelly's Creek Colliery Co., on Kelly's Creek, in the Kanawha region. The company has in mind the loading of coal from all its mines over one central tippie, and with that in view is arranging to expend about \$250,000 in improvements. The general manager of the company is J. J. Smarr.

Gassaway—Cloudbursts played havoc with mining operations on the south end of the Charleston division of the Baltimore & Ohio R. R., it being impossible to move any trains on a 75-mile stretch of road several days recently. Trestles, culverts and embankments were swept away. Not only was the main line washed out but also many sidings and branches leading to coal operations.

ILLINOIS

Zeigler—The Bell & Zoller Mining Co. is now installing in their mine here two new generators which together with other improvements also being made, will double the power capacity of their mine. A drill hole has been sunk a mile from the shaft, to be used as a conduit for the high tension wires, direct to the entries. The estimated cost of the improvements is \$39,000. They are being rushed to completion. Organization is under headway in Zeigler, for a miners' rescue team; helmets and other necessary equipment have been ordered. A new brick building is being built for the team, and it is expected that Zeigler will soon be able to boast of one of the best rescue teams in southern Illinois.

Benton—A particularly bold robbery was staged at this place on June 27 when six men seized and escaped with \$41,000 payroll money for the Middlefork mine of the United States Steel Corporation. This money in pay envelopes in the mine office, was seized by the bandits, who escaped in an automobile. All but one of the office men were shot, but only one seriously—fuel inspector John Dolan. He was at once taken in a special train to St. Louis to receive the attention of specialists. One robber was killed while attempting to escape.

The others were trailed by a posse to a thicket which was fired upon and many shots exchanged. Finally the posse captured four men and lodged them in jail at Marion; the sixth man escaped. A search is still being made for the stolen money.

Lincoln—The Lincoln-Latham Mining Co. took over the mine and plant of the Latham Coal and Mining Co. on July 1 and has announced that the mine would be run full time. The mine has been closed for some time. The new company is well organized with sufficient capital to rehabilitate the mine. Harold D. Wright is the president of the new company.

MISSOURI

St. Louis—The Missouri State Retail Coal Merchants' Association reorganized recently on the first night of its second annual convention by obtaining a closer affiliation with the National Retail Coal Dealers' Association. The convention is being held at the Planters Hotel. The officers elected were as follows: Walter Himecke, president; H. Hesse, first vice president; H. B. Carr, second vice president; W. D. Ryan, Jr., treasurer. The new board of directors are: Edward Devoy, L. P. Coan, Wm. Reister, F. W. Autenrieth, P. B. Bryan, A. Cruikshank and H. F. Schrankler. More than 200 delegates attended the convention.

Kansas City—The Southwestern Coal Operators' Association elected F. W. Lukins, of Kansas City, president at its annual meeting held at this place July 1. Mr. Lukins previously held the office for two terms. W. P. Hawkins was named general vice president, with H. J. Kellogg of Kansas City, vice president for Missouri. Joseph Fletcher, of Pittsburg, Kansas, was appointed vice president for Kansas, in place of R. J. Laurance; the latter has business of another nature which demands the greater part of his time. The association appointed M. M. Williams, of Clarkville, Ark., vice president for Arkansas, and James Cameron, Henryetta, vice president for Oklahoma. C. N. Fish, of Leavenworth was elected secretary; George Manual, of Kansas City, treasurer, and W. L. A. Johnson, general commissioner.

OKLAHOMA

Alderson—An explosion occurred on June 30 in the No. 5 mine of the Rock Island Coal Mining Co. at this place with disastrous consequences. The latest report notes that 25 men are believed to be dead, suffocated by gas or crushed by falling rock or coal as a result of the explosion. Eight bodies have been recovered and rescue crews are continuing exploration work. It is further stated that 167 men were in the mine.

Personals

W. G. Whildin, formerly general superintendent of the Lehigh Coal and Navigation Co., has been appointed manager in charge of the company's coal mining operations, with offices at Lansford, Penn. The office of general superintendent has been abolished.

A. W. Evans, a mining engineer of Petros, Tenn., was appointed chief mine inspector by Governor A. H. Roberts. Mr. Evans has been connected with the coal mines of Tennessee for some time and should be well fitted for the duties of the office both by training and education. His acquaintance with the operators and miners of the state should assist him in the performance of his new duties.

J. Noble Snider resigned his position as acting coal traffic manager of the New York Central R. R. to enter the coal business as New York state representative for Madetra, Hill & Co. He entered the service of the New York Central in 1904 in the Coal Traffic Department and occupied practically every position in the department in the 14 years of his service. He held the commission of captain in the 8th Coast Artillery Corps, N. Y. Guard.

Obituary

John Lobenate, state mine inspector for the Breese district, was killed on June 27 by a gas explosion while on a tour of inspection in the Beckmeyer mine of the Breese-Trenton Mining Co. Mr. Lobenate entered the mine after the workmen had departed; upon their return they found his body badly burned lying at the bottom of the shaft. At the inquest it was disclosed that gas explosions in the mine had been frequent. The inspector lived at Collinsville.

Trade Catalogs

Pedigreed Gears. R. D. Nuttall Co., Conway Building, Chicago, Ill. Bulletin. Pp. 16; 6 x 8 1/2 in.; illustrated. A description of Nuttall tractor gears.

We Do the Work. Cement Gun Construction Co., Chicago, Ill. Gunite book No. 6—pamphlet. Pp. 24; 6 x 9 in.; illustrated. The illustrations show recent cement-gun work in a variety of instances in different parts of the country.

"Bulldog" Jaw Crushers. Traylor Engineering and Manufacturing Co., Allentown, Penn. Bulletin JX-1. Pp. 26; 6 1/2 x 9 1/2 in.; illustrated. Notes details of the crusher and incidentally some other specialties manufactured by this company.

Canton Automatic Mine Switch Thrower. American Mine Door Co., Canton, Ohio. Bulletin. Pp. 8; 6 x 9 in.; illustrated. Notes advantages and operation of this switch thrower which is adapted for all kinds of mines and large industrial plants.

Justrite Loose-Leaf Catalog. Justrite Manufacturing Co., Chicago, Ill. Pp. 88; 9 1/2 x 6 1/2 in.; illustrated. Covers in a concise and handy way the miners' carbide lamps, acetylene lanterns, fire prevention devices and hardware specialties manufactured under the Justrite trademark. Prices are quoted.

Jeffrey Standard Apron Conveyors for Every Service. The Jeffrey Manufacturing Co., Columbus, Ohio. Catalog No. 258. Pp. 72; 8 1/2 x 11 in.; illustrated. Shows installations of both steel and wood conveyors in service in various industries, including coal plants, general dimensions and other important data of vital interest to the purchaser and engineer.

Stuart System of Ground Storage and Reclaiming. International Conveyor Corporation, 50 East 42nd St., New York City. Bulletin No. 4. Pp. 16; 8 1/2 x 11 in.; illustrated. This bulletin notes installations at various types of plants. The system is adapted to locomotive coaling, fuel distribution at yards, vessel loading and unloading and power, coke and steel plants.

Industrial News

St. Louis, Mo.—The Walter A. Zelnicker Supply Co., of this place, has added 2000 sq. ft. to its present office space—an increase of 33 1/3 per cent.

Clendenin, W. Va.—The Kanaelk Coal Co. is having plans made for a new power plant for increased operations at its coal properties. W. W. Whyte is president.

Coma, Texas—The Lone Star Coal Mining Co. is opening up a new mine at this place which is planned to have a capacity of 1000 tons daily. S. A. Wartell is the president and general manager.

Buffalo, N. Y.—Louis H. Eller, a major in the National Guard in Buffalo and in the regular army in France, has opened a coal office at 653 Elliott Square, under the name of the Eller Coal Co. Before going into service he handled the soft-coal department of E. L. Hedstrom.

Signal Mountain, Tenn.—The Suck Creek Coal Co., Chattanooga, which recently acquired the Montlake Coal Co., is arranging plans for extensive improvements and additions to increase the present capacity to about 500 tons. It is also proposed to construct a new 1500-ton capacity incline. The estimated cost of the proposed work is \$100,000.

Columbus, Ohio—John Rogers, of Columbus, and James Jones, of Athens, have purchased the mine of the Falk Coal Co., located near Buckingham on the Hocking Valley Ry. The new owners will operate the property as a partnership with offices in Columbus. The Falk Coal Co. will secure other operations and continue its business as an operator and jobber.

Charleston, W. Va.—The Kanawha City Coal Co., recently incorporated with a capital of \$50,000, is planning for the development of about 600 acres of coal properties located in the vicinity of Garnet, to have an initial daily capacity of about 125 tons. R. E. Wittke is president; F. D. Cunningham, vice president; W. W. Venable, secretary-treasurer; J. R. Cunningham, manager.

Charleston, W. Va.—Thirty or forty members of the Winding Gulf Operators' Association held a meeting at White Sulphur Springs on June 4 but no intimation was given as to what was done at the meeting. It is presumed, however, that the association gave its attention both to the railroad rate question and the matter of resuming the making of reports to the Federal Trade Commission.

Moran, Iowa—The Norwood White Coal Co. will soon complete its big mine at this place. The Foundation Co., of New York, was employed to sink the two shafts both of which are of concrete construction; quicksand was encountered but little difficulty was experienced in getting through it. The mine is to be equipped with an electric hoist and the steel tippie will have a capacity of 2500 tons daily.

Remick, Ohio—Arrangements have been perfected between the Chesapeake & Ohio and the Baltimore & Ohio railroads for taking care of any congestion of coal freight which may occur on the Chesapeake & Ohio so far as Lake-bound traffic is concerned by the establishment of a point of interchange between the two roads at this place where additional tracks will be put in. Much coal loaded in 70-ton cars will be shipped.

Hubball, W. Va.—The Russell Coal Mining Co., of Russell, Ky., recently organized, is arranging for the development of about 146 acres of coal properties in the Hubball district at an early date. The plant is to have a daily capacity of about 500 tons. In connection with the installation of equipment, it is proposed to construct an aerial tramway, 1200-foot span, to have a capacity of 50 tons per hour. W. M. Jones is president and manager.

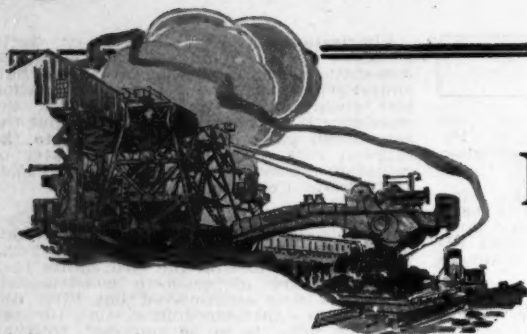
Washington, D. C.—Investigation was ordered recently by the Interstate Commerce Commission into the relationships between the rates on coal via the Lakes to Minnesota, North Dakota, South Dakota and the northern portion of Wisconsin from mines in Ohio and West Virginia and the rates on coal by rail to the same destinations from mines in Illinois and Indiana.

Many complaints have been received, alleging that the increase in the rates from Ohio and West Virginia, amounting to 52 cents a ton, disturbed the relation hitherto existing with the rates from Indiana and Illinois, which were advanced 55 cents a ton.

Huntington, W. Va.—West Virginia operators are protesting against the non-use of many hundreds of coal cars built upon orders of the government last year. Some such cars were built by the Huntington plant of the American Car & Foundry Co. There are within a short radius of Huntington about 2000 of the cars referred to not in commission but remaining idle on side tracks. The operators insist these ought to be used to relieve the shortage of equipment now in evidence and certain to become more acute as the demand for coal increases. Some of the railroads refused to accept the cars which the government had built but the C. & O. accepted such cars it is understood.

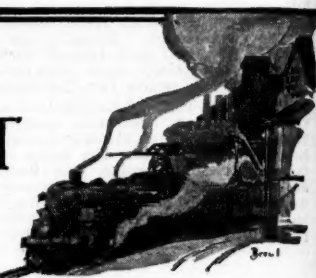
Charleston, W. Va.—That the West Virginia coke producers are upon the threshold of a resumption of coke operations after a long period of inactivity, is confidently believed by those in touch with general business conditions, particularly with the iron and steel business. The resumption of operations at iron and steel mills on both sides of the Ohio River in the Wheeling district of West Virginia on June 23 was regarded as an index to conditions elsewhere in the country and as forecasting a general resumption of iron and steel making. A further indication of an increase in shipments has been found in parts of West Virginia where during the latter part of June shipments were being increased.

Indianapolis, Ind.—The Midwest Engine Co., of this place, announces the opening of four new offices to more fully meet the growing demand for its prime movers, pumping equipment, etc. The new offices are at Jacksonville, Fla.; El Paso, Texas; New Orleans, La., and New York City. D. J. Carrison represents the company in the southeastern field; his offices are in the Florida Life Building, Jacksonville. C. B. Loomis represents the Midwest company in the southwest; his offices are in the Caples Building, El Paso. J. R. Lowe represents this company in the south and has offices in the Maison Building, New Orleans. B. H. Downing is eastern sales manager for the Midwest company; he is located at 111 Broadway, New York City.



MARKET DEPARTMENT

EDITED BY ALEX MOSS



Weekly Review

Output of Soft Coal Increasing—High-Grade Coals Hard to Obtain—Poor Car Supply and Labor Shortage Affects Production—Domestic Hard Coals in Active Demand, with Small Steam Sizes Going at Reduced Prices

PRODUCTION in the soft coal fields is picking up, the output for the week ended June 28 totaling 9,147,000 net tons, the highest since the last week in January. The increase in production, though slight, is a sure sign that conditions in the soft coal trade are improving. High-grade coals are scarce, most of the tonnage being tied up by contract. There is therefore little of the good grades of soft coal available for spot buyers. Operators producing the medium grades of coal who have so far not contracted for their output show little willingness to do so now. They are optimistic of the future and look forward to a busy fall and winter, with coal going at high prices.

Complaints of poor car supply are heard from many fields, and this,

coupled with an ever-growing scarcity of labor, will serve to handicap the mines in their endeavors to meet a belated demand for fuel this autumn.

New River and Pocahontas operations are extremely active, and the lack of cars in this region is already a disturbing factor. Both of these coals are sold up for months ahead, and the spot buyer has little chance of picking up any tonnage. The better grades of central Pennsylvania coals are also hard to obtain for the same reason.

Anthracite production for the week ended June 28 was also the highest recorded since the last week in January, the output being 1,841,500 net tons. Though the production has been growing from week to week, the supply of domestic coals is still unequal to the demand. Based on the output of 1918,

there is a shortage of more than 10,000,000 tons of hard coal to be overcome this year.

Coal produced by the so-called independent companies is in urgent request and premiums are being offered for prompt shipment. While the demand for all domestic sizes of anthracite is active, the stove and egg sizes are the favorites, and the supply of these two coals is short. More steam sizes of anthracite are being stored than was the case two weeks ago and are therefore not causing much trouble. Buckwheat No. 1 is moving readily at prices said to be 50 cents below the mine circular. Rice coal is also being quoted at about the same amount below schedule prices, while good grades of barley can be obtained from some shippers on a basis of \$1 at the mines.

WEEKLY COAL PRODUCTION

The production of bituminous coal in the week ended June 28 is estimated at 9,147,000 net tons, the highest recorded this year since the last week in January. The gain over the weeks preceding, in May and June, was slight and is attributed to buying to tide consumer over the holiday week following. The total production in the calendar year to date is estimated at 212,581,000 tons, compared with 284,585,000 tons in the corresponding period of last year.

The production of anthracite in the week ended June 28 was 1,841,500 net tons, the highest recorded since the last week in January. The production in the week ended June 21 was 1,748,000 tons. The total production in the calendar year to date is 38,796,000 tons, compared with 49,077,000 tons in the same period last year.

The most notable feature of the reports of operating conditions for the week ended June 21 is the reported loss of nearly four days' running time on account of car shortage in the Pocahontas region, and a general increase in the loss of time because of car shortage in other eastern districts. The Railroad Administration announced a short time ago that such a condition was impending and would be largely beyond its control because of the demands upon the transportation systems for the movement of other traffic.

The production of beehive coke in the week of June 28 is estimated at 286,858 net tons, a slight gain over the previous week but only about 45 per cent of the output in the corresponding week of 1918. The slackness of demand for beehive coke, which is the factor limiting production, is largely due to the increase in the past year in the capacity of byproduct ovens, which are, of course, operated in preference to buying beehive coke or operating beehive ovens.

Bituminous coal dumped at Lake Erie ports for transshipment up the lakes in the week ended June 21 was 1,058,273 net tons, an increase over the previous week in which

dumpings were 959,265 tons. The total movement of lake coal this year to date has been 8,134,601 tons, compared with 6,799,417 tons in the corresponding period of last year.

BUSINESS OPINIONS

Dry Goods Economist—The report issued on Tuesday, July 1, by the Department of Agriculture placed the condition of the cotton crop as of June 25 at 70 per cent. of normal. This means, the report says, a probable crop of about 10,986,000 bales, or more than 1,000,000 bales less than last year's yield. Due in part to this estimate, prices of July cotton rose to 33.92 cents on the New York Cotton Exchange.

The Iron Age—June pig iron output shows definitely the turn in the industry. For the thirty days the total was 2,114,863 gross tons, or 70,495 tons a day, against 2,108,056 tons in May, or 68,002 tons a day. Seventeen furnaces blew in and twelve blew out last month, a gain of five, and estimated capacity active on July 1 was 71,700 tons a day for 200 furnaces, as compared with 68,600 tons a day for 195 furnaces on June 1.

Marshall Field & Co.—Current wholesale distribution of dry goods ran a little less than for the corresponding period a year ago. More merchants were in the market than during the same week a year ago. All report excellent pre-holiday business. Orders from salesmen on the road for both immediate and future delivery were much larger in volume compared with the same week of 1918. Collections continue satisfactory.

Iron Trade Review—June definitely turned the tide in the iron and steel industry toward better and more stabilized conditions and the evidence of this fact grows with each passing week. The cumulative effects of the recent period of freer buying are marked not only by the steadily mounting line of production, but, what is probably more important, by the apparent adjustment of consumers to present price

levels. The latter factor is resulting in a continuous and increasing movement in placing future wants under contracts and in ordering out tonnage for immediate use.

American Wool and Cotton Reporter—With no surplus goods on the shelves of the clothiers or surplus raw material in the hands of the mills, it is expected that for some time to come the demand for wool will be much more than usual. In the cotton market the activity in demand, strength in prices and optimism as to the outlook stand out more clearly. The urgency of needs in the dry goods line is demonstrated by the early appearance in the eastern markets of important buyers of the South and West.

Atlantic Seaboard

BOSTON

Market continues without change in prices. Quality grades offering less freely even for spot shipment. Clearfield operators still seeking orders. Thin vein producers have difficulty keeping men. Coal at New York in better request. Pocahontas and New River shipments light to this market. Export demand shows improvement. Anthracite deliveries steadily falling behind. Domestic sizes in extremely short supply.

Bituminous—Besides a reduced output, both on account of holidays and prohibition, there has been no price movement the past week, although the undertone continues distinctly favorable to an upward swing later, especially on the fancy grades. There is still an amount of current buying at the quotations that have prevailed the past month or more, and while here and there 10@20c. is being asked for deliveries beyond July or August, there is no bidding up of prices. Conservative buyers are getting in line for fall and winter shipments on the ground that nothing can now

be gained by waiting, and then, too, they have noticed that desirable fuels that were easy to get 60 days ago are now practically out of the market. The trade is somewhat puzzled that higher prices are so long coming, but one reason doubtless is the volume of lower grades that shippers have tried to force on this market. No price movement is likely until less effort is made to depress the spot market by offering less desirable coal at ridiculously low prices.

The higher priced Cambrias are fast disappearing from the market. Practically no contract business has been done in these grades for the past fortnight, and now orders are being declined in many instances, even for spot shipment. This has been particularly true of those coals which are being taken for the Navy on recent requisitions. Most shippers are in doubt as to the volume they will have free in the fall and so long as the Navy Department is paying \$3 or more per net ton it is likely that many operators will continue "marking time" rather than load themselves with orders for deferred delivery. One of the features of the present market is the widely different attitude of buyers as between high grade low volatiles and the high ash higher volatiles. The former are not only in steady demand but they are increasingly hard to get.

The less favorably known coals, on the other hand, are able to get business enough for only a very limited output. In several sections of Clearfield County this has been particularly true, although within a few days it is noticeable that some of the better prepared coals in this region have had a spurt, accounted for by the fact that there is beginning to be an actual dearth of Miller Vein and "C" prime coals for prompt shipment. There are still some heavy reserve stocks in New England and that is a special reason why steam-users in this territory are anxious not to increase their supplies of only ordinary "D" and "E" seam coals. The low figures quoted a month ago are still necessary apparently to induce any considerable movement of these grades.

Receipts here from Hampton Roads are still relatively light. Some of the agencies are doing very little business in the open market. Others have undertaken to supply staple customers directly on tidewater but have practically abandoned to all-rail distributors their usual trade inland. Both Pocahontas and New River tonnages will show very heavy reductions in New England business the current year, even as compared with 1915-1916, and it is not easy to see how this tonnage can be won back. Marine freights are likely to be on a high level for an indefinite period certainly as compared with rates all-rail, unless under private management the railroads show a determination to restore old equilibrium as between rail and water deliveries.

The export demand is much improved, as was expected would be the case with the formal signing of peace. An order from the French Government is looked upon only as one of a number from European markets which England will find it hard to supply. The South American demand continues strong and prices offshore generally are so much more remunerative it is not surprising that even New England interests are giving much more attention to shipments overseas. Less has been heard of labor conditions in the so-called smokeless districts in West Virginia and current reports are favorable to a continued heavy movement to the Hampton Roads piers.

Current quotations on bituminous at wholesale range about as follows:

	Clearfields	Cambrias and Somersets
F.o.b. mines, net tons....	\$2.15@2.75	\$2.90@3.40
F.o.b. Philadelphia, gross tons.....	4.27@4.95	5.10@5.55
F.o.b. New York, gross tons.....	4.62@5.29	5.45@6.00
Alongside Boston (water coal), gross tons.....	6.10@6.85	7.00@7.50
Georges Creek is still quoted at \$3.20 per net ton f.o.b. mines.		

Pocahontas and New River are being quoted at \$5.14@5.35 per gross ton f.o.b. Norfolk and Newport News, Va. Alongside Boston the same grades are being offered at a range of from \$7.32@7.60, and on cars Boston and Providence at from \$7.50@7.90 per gross ton.

Anthracite—Retail dealers are exceedingly anxious over the slowness with which domestic sizes are being shipped. Predictions that June and July would show an easing up of egg and stove, the sizes in greatest demand, were not borne out by the tonnage shipped in June, and unless the trade has been misled by the heavy volume

of coal distributed at retail during April and May each week now sees all the sources falling farther behind on deliveries. In several cities in this territory retail prices have been advanced 50c, partly because of the increasing premium exacted by several of the independent operators. Circular prices f.o.b. mine are on the basis of \$6.15 for egg, but rules by "independent" shippers have been made at a full dollar above that figure.

Egg, stove and chestnut are in very short supply both all-rail and by water. Buyers are being obliged to take a large proportion of less desirable sizes in order to get any tonnage forward.

NEW YORK

Demand for domestic coals continues, but retail dealers say the pressure for quick deliveries has lessened, owing to the vacation season. Dumpings at the railroad docks show a decrease. Anthracite steam coals easy. Bituminous operators and shippers hopeful, but fear transportation facilities in fall and winter.

Anthracite—All houses report a continuation of the heavy demand for the domestic coals, and although the retail dealers say there is not so much pressure being brought to bear upon them for quick deliveries, because of the exodus of many homeowners to the country and seashore, they are anxious to, put away all the winter fuel they can secure. There has been no reduction in the accumulation of orders on the books of the wholesale houses, and so far there are no signs ahead that the country is to be saved from a near coal famine next winter, unless production increases materially.

There has been a healthy growth in production for the past few weeks, but there is a shortage of more than 10,000,000 tons to be overcome, when this year's production is compared with that of the corresponding period of last year. Dealers claim there is a deficit in receipts in this market but expect larger shipments when those sections farther removed from the source of supply are cared for.

Independent coals are in heavy demand and premiums are being offered for shipments. These, it is reported, range all the way to \$1, the Canadian dealers offering the highest amount.

While there is an active market for all domestic coals, stove and egg are shortest in supply. Chestnut in this market is easier, but is being easily absorbed when egg and stove form part of the shipment. Pea coal is being handled easily, local dealers taking it when they can secure either egg or stove with it.

The steam coals are not causing so much trouble as they did a few weeks ago because of the tendency to store them. Retail dealers, as they did some time ago, are taking considerable buckwheat No. 1 at prices said to be 50c. below mine circular. Rice is also being quoted at about the same amount below regular company mine price, while good grades of barley are being quoted by some shippers in the neighborhood of \$1 at the mines.

Current quotations, white ash, per gross ton at the mines and f.o.b. at tidewater, at the lower ports, according to company schedule, are as follows:

	Mine	Tidewater
Broken.....	\$5.95	\$7.80
Egg.....	6.15	8.00
Stove.....	6.40	8.25
Chestnut.....	6.50	8.35
Pea.....	5.10	6.85
Buckwheat.....	3.40	5.15
Rice.....	2.75	4.50
Barley.....	2.25	4.00

Bituminous—There is a brighter outlook in the bituminous situation. Reports that some of the foreign countries are to make heavy purchases of coal here led to a slight flurry and stiffening of quotations for coal stocks in the stock market. This feeling was reflected among the trade.

Tonnage figures show a sure indication of an uplift. Production has steadily increased and there is a better feeling throughout. High-grade coals are hard to pick up. Most of these grades are tied up in contracts with very little to offer to spot buyers. Operators having plenty of the medium grades not tied up are not now inclined to sign up any part of their free output. They are exceedingly optimistic of the future and look forward to a busy fall and winter.

Numerous complaints have been heard of poor car equipment, repairs not having been made. There is also some complaint of poor car supply and this, it is pointed out, will become more general as the season advances. Shippers say that consumers who

have hesitated to buy will likely suffer from the lack of fuel this fall and winter more from the lack of cars than because of the scarcity of coal. The cars, they say, will be necessary to move grain and to take care of the needs of the steel industry and will be used for these purposes when needed, to the detriment of the coal business.

From the New River and Pocahontas regions come reports of considerable activity together with complaints of bad car supply. Both of these coals are heavily sold ahead and the spot buyer has little chance of picking up stray lots. The better grades of central Pennsylvania coals are also hard to obtain, most of them being under contract.

There is a better demand for all-rail deliveries than here at tidewater. Prices are also slightly better, although there is a tendency to some improvement for tidewater coals.

Prices on the various pool coals f.o.b. at this Tidewater range about as follows:

Pools 1 and 71, \$5.40 to \$5.60; Pool 9, \$5.30 to \$5.50; Pool No. 10, \$5 to \$5.25 and Pool 11, \$4.75 to \$5.00.

Quotations on the various grades, per net ton at the mine, range about as follows:

South Fork (Best).....	\$2.95@3.25
Cambria (Best).....	2.75@2.95
Cambria (Ordinary).....	2.35@2.50
Clearfield (Best).....	2.75@2.95
Clearfield (Ordinary).....	2.35@2.50
Reynoldsville.....	2.50@2.75
Quemahoning.....	2.75@2.95
Somerset (Best).....	2.75@2.95
Somerset (Poor).....	2.15@2.35
Western Maryland.....	2.75@2.95
Fairmont.....	2.75@2.95
Latrobe.....	2.10@2.25
Greensburg.....	2.35@2.50
Westmoreland 1 in.....	2.60@2.75
Westmoreland run-of-mine.....	2.35@2.50

PHILADELPHIA

Anthracite demand remains strong. Shipments disappointing. Dealers have good business on books. Call for stove increases. Egg and nut demand heavy. Pea plentiful and stocks increase. Advertising campaign influences ordering. Credits in fair shape. Retailers giving longer time to certain class. Steam coal draggy except buckwheat. Bituminous stationary. Prices well held. Holidays make good grades tighter.

Anthracite—There continues to be a strong retail demand for all sizes of coal, except possibly pea, and even good quantities of this size are being moved. While the month of July so far has been unusually warm, the dealers report they have received a fair addition of orders to those already filed.

The unusual demand for egg shows no signs of diminution and the dealers are really surprised at the call for this size as compared with some years back, and still further surprised at their inability to get the tonnage they need to fill the orders they have. Pea coal is the one size that all dealers have in greater or less quantity and a fair proportion of the receipts are being placed in the cellars; but on the whole the stocks above ground are increasing.

With the slackening up in the orders from consumers some dealers are urging their customers to take in at least a fair proportion of pea, using the argument that it will not be any cheaper and also when the demand does come in the fall and winter they will be unable to meet it unless a greater quantity is stored in the cellars of the people. A great drawback to this is that while the people are entirely willing in numerous instances, there is a lack of ready money among the class who are the largest users of this size.

Due to the holiday happening on Friday most of the retail men closed up their yards for the remainder of the week, as they reasoned that similar conditions would rule at the mines and their prospects of getting increased shipments at this time were slight. As a matter of fact no one feels that coal will come in really heavy volume until well past the middle of the month, when they have hopes that the outside markets will be fairly well taken care of. However, from the shippers' standpoint this is hardly likely to happen, as a number consulted stated they had orders enough on their books for the larger sizes to keep them busy almost indefinitely.

As to prices, the company circular is being strictly maintained by the larger producers, while the independent prices still range from 15c. to 40c. above this figure. We have heard of a sale in a rare instance of 70c. above circular, but this is sporadic and in no way indicative of the market trend.

The steam trade changes but very little, although the good grades of buckwheat are in active demand. It is not believed, though, that the entire output of this size is being taken, and the big companies are placing a fair tonnage in storage. The call for rice and barley has in no wise increased and the companies are adding to their accumulations of this size very materially.

Bituminous—The position of soft coal as regards demand has lately inclined to remain stationary. In some instances we do hear of certain operations increasing their output, but on the whole the call for coal remains at about the same volume prevailing for the past six weeks. While prices have also remained stable, there was some tendency after the holidays to a strengthening in the better grades. All along it has been somewhat difficult to get fine coals promptly and the shortening of the working time due to the closing down in the latter part of the week made it more difficult to get the fine coals. Certain it is, that while there is no immediate hope of a price increase on the part of producers, the market is in such a condition that they will certainly move forward if any change is made at all.

The more progressive concerns hereabouts still display a tendency to take in coal in excess of their current requirements, while there are plenty of inquiries from consumers asking contract quotations but very little business of this kind closed, as the majority of the good shippers have obligated themselves for the full allotment of tonnage they expect to have available for this purpose.

The prices prevailing here are as follows:

Georges Creek Pig Vein.....	\$2.95 @ \$3.05
South Fork Miller Vein.....	2.95 @ 3.05
Clearfield (ordinary).....	2.60 @ 2.75
Somersett (ordinary).....	2.50 @ 2.65
Fairmont lump.....	2.50 @ 2.60
Fairmont mine-run.....	2.35 @ 2.50
Fairmont slack.....	1.90 @ 2.05
Fairmont lump (ordinary).....	2.25 @ 2.35
Fairmont mine-run.....	2.00 @ 2.15
Fairmont slack.....	1.65 @ 1.75

BALTIMORE

Fine export business and better spot market in bituminous. Anthracite receipts low.

With three months of the coal year passed and July getting a good start, there continues to be plenty of export business and a firmer spot market for the bituminous men, while the anthracite dealers have announced an increase in the schedule of from 25 to 50 cents per ton. The increase has been looked for, and it is expected that it will show a still further raise in August or September.

As the large stock of high-grade coals which has been around Baltimore for some time began to decrease during the past week the prices became firmer. This was due to several reasons. A great amount of the coal was used to fill some of the export orders and there was also a falling off in receipts, the falling off being due to shortage of cars and the demand of the lake region business.

The receipts during this week are expected to be very light, for the Fourth of July will provide a two-day layoff for the miners, and it is impossible to forecast what effect prohibition will have. With the light production and the supply of good coals here diminished, better prices are looked for. During the week \$2.75 was the prevailing figure for the best grade of coals. There was no demand for the medium or cheap grade of fuels.

The anthracite receipts continue to be low, and while the increase is slight the forecast is that it will go higher with the possibility of many homes being without fuel if they do not get orders in promptly. A comparison of the prices of July 1 with those of the Apr. 1 schedule follows:

	July 1— Ton	Half Ton	April 1— Ton	Half Ton
Hard White Ash				
No. 1 (broken).....	\$11.50	\$5.90	\$11.50	\$5.90
No. 2 (egg).....	11.75	6.05	11.50	5.90
No. 3 (stove).....	12.00	6.15	11.75	6.00
No. 4 (chestnut).....	12.10	6.20	11.85	6.10
Pea coal.....	10.25	5.30	10.00	5.15
Buckwheat.....	8.20	4.25	8.20	4.25
Sunbury				
No. 2 (egg).....	12.00	6.15	11.50	5.90
No. 3 (stove).....	12.25	6.25	11.75	6.00
No. 4 (chestnut).....	12.35	6.25	11.85	6.10
Lykens Valley				
No. 2 (egg).....	12.45	6.35	12.20	6.25
No. 3 (stove).....	12.85	6.50	12.60	6.45
No. 4 (chestnut).....	12.85	6.50	12.60	6.45

A charge of 50 cents additional for bagging and a discount of 25 cents for cash is allowed on the present schedule.

Lake Markets

PITTSBURGH

Coal market stiffer. Contracts not acceptable. Steam coal almost reaches gas coal in price. Prospects of domestic consumption.

The Pittsburgh district coal market has stiffened perceptibly in the past week, spot prices being higher while operators have become entirely averse to making any additional contracts for the coal year. The situation as to contracts is that the tonnage put under contract is the tonnage the operators feel reasonably certain they will be able to deliver, with only normal car shortages, and without labor disturbances. Consumers not covered by contracts will have to depend on the prompt market, and the question is whether the coal that will be released by the closing of lake navigation will be sufficient to take care of demands late in the fall and during the winter.

On the basis of men on payrolls, coal production in the Pittsburgh district is at about 75 per cent, but the actual proportion, relative to theoretical full output, is less, as fewer men are on payrolls than the mines would accommodate. Labor supplies bids fair to decrease rather than increase as many of the foreign born assert positively they are going back to the countries of their birth when transportation is available.

Steam and gas coal have now reached almost a market parity, steam coal having previously been much easier than gas. Lake shipments are now running chiefly to steam coal, the pressure early in the season for moving gas coal having subsided. The situation is shown by prices obtainable for slack, which at present is produced almost exclusively by the screening of coal for lake shipment, steam slack being available at as low as \$1.30, while gas slack brings \$1.70 and higher. A number of operators have advanced their prices on mine-run to \$2.50 and they regard that price as applicable to prompt shipments only as they will not book additional contracts. There is practically no demand for domestic coal, as natural gas takes care of nearly all domestic fuel requirements. Domestic consumers do not seem to be alive to the menace of the West Virginia law enacted some time ago, prohibiting the movement of natural gas out of the state if consumers in the state are not fully supplied, but the coal interests point out that there may be much demand for domestic coal next winter on account of this gas situation, and no provision is being made by way of accumulating supplies. The best estimate, applicable to conditions of the past few years, is that taking the year as a whole 12 per cent. of the Pittsburgh district coal production is used for domestic purposes. The proportion may be much higher next winter.

The market is now quotable as follows, for spot and prompt: Steam slack, \$1.30 @ 1.40; gas slack, \$1.70 @ 1.80; steam mine-run, \$2.25 @ 2.50; gas mine-run, \$2.35 @ 2.50; 3-in., \$2.60 @ 2.75 per net ton at mine, Pittsburgh district.

TORONTO

Supplies of anthracite much below demand though rail shipments well maintained. Little arriving by water. Consumers of stove coal substituting other sizes. Nut coal becoming scarce. Bituminous advancing in price.

The demand for anthracite is still much greater than the supply, though shipments from the mines are coming forward in about the normal quantity by rail. Very little is being received by water, the great bulk of shipments by vessel going up the lakes. There is still a marked shortage of stove coal, though at the instance of the dealers many consumers are taking nut and egg sizes as substitutes, resulting in an increasing scarcity of nut coal. The market for bituminous remains quiet with local prices unchanged but due to advance shortly, as the Youghiogheny operators have notified the dealers of an advance of 15c. per ton for July shipments.

Quotations for short tons are as follows:

Retail:	
Anthracite, egg, stove, nut and grate.....	\$11.50
Pea.....	10.00
Bituminous steam.....	7.50
Slack.....	6.50
Domestic lump.....	10.00
Cannel.....	11.50
Wholesale f.o.b. cars at destination:	
Three-quarter lump.....	5.75
Slack.....	4.44

BUFFALO

Some advance in bituminous price. Improvement reported by most shippers; may be large if car shortage increases. General shortage of anthracite. Lake shipments fair.

Bituminous—The firm feeling in Pennsylvania coal circles has extended to this market, and an advance of a few cents shows that the trade finds it can hold the situation and not depend on the consumer for prices any longer. The volume of movement has not increased much as yet, but if the improvement in the iron industry goes on the consumption will begin to mount up before long.

The consumer is now ready to contract, in fact is eager to do so, but the shipper holds off. It is no advantage to him, even with stationary prices, to make contracts such as are offered; besides nobody looks for anything but an advance, which will be large if the present predictions are made good. Consumers are not confident and view the situation uneasily. The feeling on both sides is that it is too late to contract, and if prices continue to go up few will be made this season.

Shippers now quote bituminous as follows: Allegheny Valley, all sizes, \$4.45; Pittsburgh and No. 8 lump, \$4.80; same, three-quarter, \$4.65; mine run, \$4.25; all slack, \$3.25. Slack is plentiful and is not advancing to any great extent. All quotations are per net ton f.o.b. Buffalo. Pittsburgh is advancing again, and Buffalo will soon have to follow.

Anthracite—The demand is not so insistent as it was, as hot weather discourages it and many families are now supplied. Shippers still hold that a winter shortage is before us and advise laying in a supply when it can be had. The all-rail demand is heavy and as much as possible is put into that trade, so that outlying territory at least may be taken care of during open weather.

The anthracite shipments by lake keep up well, being for the season to July 1,246,999 net tons, as against 866,156 tons for the same time last season; for June, 453,797 tons and 433,550 tons for June, 1918; for the past week, 104,150 tons, of which 43,000 tons cleared for Chicago, 29,000 tons for Milwaukee, 19,300 tons for Duluth and Superior, 6000 tons for Waukegan, 5500 tons for Hubbell and 1350 tons for Depere.

Freight rates are quiet at 60 cents to Chicago, 47½ cents to Milwaukee and Waukegan, 42½ cents to Duluth and Hubbell, consignee's rate to Depere.

Anthracite, except the extremes of domestic sizes, grate and buckwheat, advanced 10 cents a ton for July and is quoted as follows:

	F.o.b. Car, Gross Tons	At Curb Net Tons
Grate.....	\$8.55	\$10.20
Egg.....	8.75	10.50
Stove.....	9.00	10.70
Chestnut.....	9.10	10.80
Pea.....	7.30	9.25
Buckwheat.....	5.70	7.75

CLEVELAND

Demand for bituminous coal continues to increase and prices are being strengthened in proportion. Nevertheless, steam-coal users are not responding in coal purchasing to the extent business in general is picking up. Domestic demand for anthracite and Pocahontas continues good.

Bituminous—Steam-coal users and the lake trade at present may be said to be taking every ton of coal eastern and southern Ohio operators are able to bring forward. With the mines being operated at not over 60 per cent. of capacity, it may be seen that in reality buyers are not taking as much coal as surface indications would show. In every department of industry northern Ohio now is on better than a 75 per cent. basis; the iron and steel industry—the biggest single consumer of coal—is rapidly approximating 100 per cent, yet coal is not being taken in satisfactory tonnages. More and more desire to stock for the coming winter is being evidenced, yet the undertone of the market, in regard to movement, is not satisfactory. Compared with conditions a few months ago and with what many operators predicted for the early summer, the coal trade may be said to be booming. But contrasted with the urgent need for stocking fuel and the condition the mines are approaching, steam-coal users are not responding to a degree hoped for.

On slack the market appears quite deceptive. Some operators are talking of \$2 and \$2.10 slack and say they would not take a cent less. On the other hand, it

appears that some slack has been sold as low as \$1.40 in northern Ohio recently. Mine-run may be said to be centering around \$2.25. Prices are gaining strength constantly, as talk of a shortage this winter increases.

Conditions at the mines continue unsatisfactory. Car shortages appear in streaks—a good run one day and next to no cars the next. The outflow of labor shows no signs of abating, but this has been offset in part by the return of a few skilled miners who left for other employment in the slack days following the armistice.

Anthracite and Pocahontas—Some dealers are contemplating a 50-cent advance in anthracite prices shortly. Demand continues good; in fact, is better than the supply. Much the same condition obtains with Pocahontas. Dealers estimate their summer business so far has been about 20 per cent. above normal.

Lake Trade—Lake shipments of bituminous coal to July 1 will show a gain of about 1,500,000 tons over shipments to July 1 last year, which were about 7,500,000 tons, it is predicted. The 9,000,000-ton mark will be attained by July 1, many believe. Lake Erie docks now are keeping the pace of better than 1,000,000 tons of cargo coal a week. From Duluth and Superior comes the word that receipts of bituminous coal there to July 1 totaled 4,767,000 tons, compared with 1,992,200 tons last year. Receipts of anthracite to July 1 this year and last year, respectively, are given as 562,000 and 1,375,600 tons. The supply of cargo space has exceeded the coal tonnage at the car dumpers the past ten days. Lake shipments of slack, always small, have increased somewhat.

DETROIT

Steam coal is not yet awakening the interest of Detroit consumers to the extent present conditions and future outlook would seem to justify.

Bituminous—Consumers of steam coal in Detroit are continuing the more or less indifferent attitude that has characterized this division of the business since early in the year. There is a moderate demand for domestic stock, but sales of steam coal are disappointingly small and, according to wholesalers and jobbers, do not reflect a broad general buying movement such as the present market conditions and forecasts would suggest is advisable.

Few of the large consumers show any interest in opening negotiations on a contract basis. The producers also are said to be showing indifference concerning contracts. This attitude is attributed to a disinclination to assume obligations at present prices that might prove unsatisfactory in case increasing costs necessitate an advance in prices later.

The movement of bituminous into Detroit is not of very large volume and is said to be considerably below what was regarded as normal before the war. Some coal is to be found on tracks. The amount is not great. Jobbers believe it would be difficult for consumers of steam coal to replenish stocks regularly from track coal.

Net ton prices at the mines on West Virginia gas or splint lump are quoted at \$3 to \$3.25 and for two-inch lump \$2.85, while run of mine ranges from about \$2.10 to \$2.15 and slack averages \$1.75. On Hocking domestic lump the price is given at \$2.75, with \$2 for mine run and about \$1.50 for slack. The product of other leading Ohio districts is said to be selling at about the same price as Hocking. Smokeless coal is limited in supply, with practically no lump or egg to be had. Mine run is quoted at \$2.75 to \$3, when available.

In the yards of many of the industrial consumers there is still considerable of the low grade coal that went into reserve last year. This is exerting an influence unfavorable to renewal of buying.

Anthracite—Household consumers are taking their time about stocking up for winter requirements. Higher temperatures during the week are a discouraging factor. Retailers are still endeavoring to spread the early buying movement, but are apparently not meeting with the success that might be expected, considering the shortage of supply last winter.

Lake Trade—Shipments over lake routes are easing off, though vessel capacity is available in large amount.

COLUMBUS

There is a decided improvement in the coal trade in Ohio territory. Steam buying is better and the same is true of the domestic trade. The lake movement is steady. Coal men generally predict a much improved market within the coming two months.

The domestic trade is now attracting considerable attention as buying on the part of the retailers is better. Householders are awakening to the fact that they should put in their winter's supply, and while a few orders for delivery during the month of July have been booked, the one thing that is holding up the domestic trade is the unsettled real estate condition. With housing conditions so stringent, renters are not sure that they will be permitted to retain their dwellings.

All these factors have been holding up the retail trade to a large degree. There is a good demand for the fancy grades such as Pocahontas and West Virginia. Rescreened varieties are also selling better. An increased demand for Hocking lump is also reported, and generally speaking the domestic trade is in good shape. Retailers are now inclined to stock up to a certain extent. Retail prices are higher, with Pocahontas selling in the neighborhood of \$7.50.

The steam trade is also showing signs of awakening. Steam users have been in the market and quite a few contracts have been closed within the past few weeks. Reserve stocks are pretty generally used up and purchasing agents are negotiating for a renewal of supply. Iron and steel plants are using a larger tonnage than formerly. General manufacturing is rather slow to resume, but fuel requirements are gradually increasing. Steam prices show distinct strength and there is every indication of still higher levels. Railroads are not taking the tonnage that was expected and that is the worst feature of the trade.

The lake trade is going along steadily with loadings at the docks fairly large. A good tonnage is moving to the Northwest from Ohio and West Virginia mines. There is no congestion on the upper lake docks as the movement to the interior is rather active. Practically all of the lake contracts have been made and there is little opportunity for tonnage to be sold later on.

Production is rather good in all of the producing fields of Ohio. This is especially noticeable in the eastern Ohio field, where the output is estimated at 60 to 75 per cent. **Pomeroy Bend field also shows an increase.** Cambridge and Crooksville are producing a fair tonnage and the same is true of the Hocking Valley field.

CINCINNATI

Little change in condition, though outlook is brighter. Car and labor shortage.

Coal dealers and operators in the Cincinnati market report little change over conditions last week, although they say a gradual improvement is noted which should gain in momentum from now on. They attribute whatever change there is in the situation to the constant advertising of the national association and the local dealers.

Domestic users have about resigned themselves to the fact that there will be little smokeless coal for them this season and are beginning to take whatever little of this grade is available for their consumption. Orders placed the past week by household users of coal have shown a decided increase over the past few weeks.

Dealers look for a rush of business during July and August. The warning has gone out that there will be a serious shortage of gas the coming winter, and those who experienced the discomforts of a shortage two years ago are taking no chances but are laying in their supply of coal so as to be prepared when the shortage does come.

Reports of car and labor shortage in the smokeless coal fields continue to come in. There appears to be a good movement of coal from these fields, but much of it is going to the seaboard and lakes, with some reaching the storage piles of those dealers who saw far enough ahead to get in their orders for mine-run.

LOUISVILLE

Retailers advance prices on domestic coal. Car shortage beginning to be felt. Good demand for domestic coal, with steam grades still dull. Market slightly stiffer.

Louisville retailers have made general advances on domestic coal, this advance being forced by advances on the part of operators, who have advanced domestic to take care of shrunken values of spot steam. Starting July 1, all eastern Kentucky coal jumped to \$7 a ton retail, with West Virginia river still selling at \$6.50. Western Kentucky lump advanced 15c. a ton to \$5.75. Coke is selling at \$10.25 and anthracite at \$12.75. Smokeless has advanced to \$8. Mine-run is retailing at 50c. under lump, and screenings at \$1 under lump.

There is a good retail demand for coal, with operators in the retail field operating

about 70 per cent. full equipment. Stocking demand on domestic is about 35 per cent. of deliveries, with the balance of the demand coming from small steam plants.

Eastern Kentucky mines are operating about six days a week, with western Kentucky about two days. Car shortages are becoming more general, and many reports are being received of cars being delivered in bad shape.

Quotations show: Eastern Kentucky block, \$3.50@3.75; mine run, \$2.50@2.75; nut and slack, \$1.85@2.25; western Kentucky lump, \$2.25@2.50; mine run, \$2@2.10; screenings, \$1.50@1.75; fine screenings, \$1.40@1.50.

Eastern Kentucky coals are all stronger, although there is still a marked need for business on screenings. Many operators are refusing additional business for block coal, as they cannot dispose of the screenings.

The labor situation is in fairly good shape, but there has been a good deal of shifting, with labor leaving western Kentucky two-day mines for eastern Kentucky mines that are operating almost full time.

BIRMINGHAM

Steam-coal market has strengthened during past week. Domestic remains stiff and premium prices are offered for spot tonnage, but little is available. Production shows a decline over previous week.

There has been a perceptible strengthening in the demand for steam grades the past few days, some new contracts have been made and old ones, with few exceptions, are being renewed as they expire. The general industrial demand is better and in the aggregate a considerable tonnage is moving. A public utility company closed for approximately 50,000 tons for the next twelve months at Government price. The Louisville & Nashville R.R. is reported to have closed for a small portion of its requirements for the next year, the major portion of the coal taken from this district by that line not having been allotted as yet. The Southern Ry. is now receiving new bids from local producers, having rejected the bids received on its former inquiry. Bunker business is showing some gains with an increased demand from ships making the ports of Mobile and New Orleans.

The domestic market is decidedly stiff, all operators having tied up practically all their output in contracts, and spot coal brings a premium when available. Piper, Coleanor and Montevallo lump is readily taken at \$5.50 per ton mines, but there is little to be had of this high grade fuel from the Cahaba and Montevallo fields.

Production for the week ending June 21, as reported to the Alabama Coal Operators' Association, shows an output of 224,513 net tons, a material reduction as compared with the previous week. Labor is getting restless under restricted operating schedules and is beginning to leave the district for other fields. However, the indications are that the next week or two will see the blowing in of at least three additional furnaces, which will enable some idle mines to resume and others to go on fuller schedules.

Coke

CONNELLSVILLE

Contracting practically concluded. Stiffening in spot before holiday. Production increasing.

Little additional contract business in furnace coke has been closed in the past week, as nearly all the blast furnaces in operation had already covered. Several furnaces now out of blast have desired to contract, but operators are indisposed to take such chances and the furnaces will probably have to guarantee they will go into blast before they can make requirement contracts. The great bulk of the contracting was on a ratio basis, as explained in previous reports, the proportion being 6 to 1, coke per net ton at ovens against basic pig iron per gross ton at valley furnaces, with monthly adjustment of invoice price.

While there have been reports of furnace coke contracts being made at flat prices, only one such case is definitely known, the price in that instance being a special one of \$4 for July shipment, \$4.40 being the figure for the remaining five months of the half-year.

The spot coke market stiffened up sharply a week before Independence Day, \$4.25 being the minimum for furnace coke, with some operators demanding more. The market has been quiet the past few days but is still quotable at the advanced figure. Spot foundry coke at \$4.50, one a common

price, has been growing scarcer, but as a rule some can still be picked up at that figure, choicer brands commanding up to \$5.

While some operators regard coke as established on the higher level recently attained by the spot market, there are others who are willing to sell furnace coke for the remainder of July at \$4, which was the usual settling price for June on monthly adjustment contracts, a few having been settled at \$3.75. These monthly adjustment contracts are now a thing of the past. They had developed on Feb. 1 from contracts that had been written at Government price, but subject to negotiation should the Government price be withdrawn. The market is now quotable as follows: Spot furnace, \$4.25; spot and prompt foundry, \$4.50 @ 5; contract foundry, \$5 @ 5.50, per net ton at ovens.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended June 28 at 138,633 tons, an increase of 7433 tons.

Buffalo—The price of coke advances slowly, in sympathy with bituminous coal, and a firmer market is in prospect hereafter, as the furnaces are running much more actively than they were a month ago. Quotations, per net ton f.o.b. Buffalo are \$7.85 for 72-hour Connellsville foundry, \$7.10 to \$7.35 for 48-hour furnace and \$6.20 for off grades. The sale of breeze and other fine stuff has not been resumed to any extent, on account of the very low price of slack coal.

Middle Western

GENERAL REVIEW

The market continues without any radical changes, either for the better or the worse. Steam sizes continue inactive, while prepared domestic sizes are in very good demand. Operators are feeling better these days, however, because they think they see better times ahead, and in the immediate future.

The campaign recently undertaken by the National Coal Association to stimulate buying is now well started, but the results obtained so far have been from the domestic trade, rather than the steam. The big manufacturers, as yet, do not realize the seriousness of the present situation, and therefore do not show much interest either in contracts or current sales. A well organized drive for steam business has been started by a number of coal operators' associations in the Middle West, but the results obtained have been nothing to brag about. The present opinion of the operators is that they have done their best to get the public to contract. The public will not contract, therefore the operators are relieved of responsibility and, with justice, can sell their coals to the highest bidder during the fall and winter months. It must be admitted that the producers are looking forward to this situation with considerable anticipation. While we are on this subject it might be well to say that last week there developed a car shortage in the Harrisburg field that practically closed 90 per cent. of the mines in that district. It is true that this condition developed only on the Big Four R.R., but it is extremely likely other roads will be affected a little later on. We understand there are plenty of cars, but most of them are in such poor repair that they are unfit for coal hauling. The labor question is again coming to a position of prominence, and many opinions, practically all different, are to be heard. It seems pretty generally conceded, how-

ever, that the miners will demand more money.

The Franklin County field in Illinois experienced another consolidation the other day, when the Old Ben Coal Corporation took over the T. C. Keller properties at Sesser, Ill., on the C. B. & Q. R.R. This gives the Old Ben Coal Corporation eight mines in Franklin County, all of them producing very good coal, both from the standpoint of high natural quality and excellent preparation. We predicted some time back that the Franklin mines would soon be in the hands of two or three very strong operating and sales companies, and our predictions appear to be developing. It will be interesting to note the next independent mines to be absorbed. The trade, in general, looks with favor upon these consolidations, as it puts important mines in strong hands and hence stabilizes the industry.

A mine in the Belleville district of Illinois sold from 500 to 1200 tons per day of mine run and screenings to the Chicago Great Western R.R. on a basis of \$1.70 mines per ton for mine run and \$1.40 per ton for screenings. Contrary to expectations the trade looked upon this sale with favor as it removed a tonnage from the market that was being sold at pretty low prices, and consequently demoralizing the market, it is said.

CHICAGO

Poor market on screenings. Domestic coal situation improving daily. High grade eastern coals hard to get.

The market on screenings is in bad shape. We hear from very good authority that southern Illinois screenings of good quality have been selling at \$1.50 mines, with the steam coal public showing but little interest even at these prices. We gather, however, that certain manufacturing interests whose plants have been closed for the last six months are now starting up again, and soon will be running full time. There is no use in camouflaging the steam-coal situation, as it couldn't be worse than it is today. Operators are looking for better business on Monday, because the mines being closed over the Fourth as well as Saturday and Sunday will automatically keep some of the surplus from the open market.

The situation on domestic coals is improving daily, and operators having a surplus of lump, egg, nut or even smaller prepared sizes are having no trouble in selling the product in Chicago. High-grade eastern coals are at a decided premium, and will be harder to get as the season advances.

MILWAUKEE

Advance in anthracite and Pocahontas announced with the opening of July. Coke also shored up a notch. Demand increasing under the agitation of threatened shortage.

July 1 brought the customary monthly advance of 10c. per ton on all grades of anthracite except buckwheat, which remains stationary in price. Screened Pocahontas was also put up 50c. per ton, while mine run was advanced only 25c. Coke was given a lift of 25c. per ton, making the prevailing price of that commodity \$11.25. The demand for coal has increased both in the city and country as a result of a campaign of publicity in which the danger of a coal shortage next winter is given credence. Milwaukee is faring well in the matter of receipts by lake, and unless there is a sudden and continued cessation of this supply there will be ample fuel for the Wisconsin district when the season of navigation closes. It will be advantageous.

however, if the demand can be stimulated so as to relieve the docks and make way for additional supplies. Receipts by lake for the months of April, May and June aggregate 204,037 tons of anthracite and 1,148,753 tons of soft coal, against 164,889 tons of the former and 827,436 tons of the latter during the same period last year.

Chestnut anthracite is \$12.50; stove, \$12.40; egg, \$12.20; pea, \$11, and buckwheat \$9.75. Coke is \$11.25, Pocahontas screened \$10.25 and mine-run \$8.

ST. LOUIS

Considerable activity in domestic sizes of higher grade fuels, while low grade coal finds no demand. Steam coal market hard to find and over-supply is keeping mines idle. Future domestic supply in doubt on this account.

The past week witnessed the opening up of the orders for high-grade storage coal. The retail price advance of 25c. a ton on July 1 set things going when it was backed up by national newspaper advertising.

This demand is almost entirely for Carterville, but there is some call for hard coal, a little smokeless and considerable coke. Almost no demand at all for Mt. Olive and no Standard aside from a small tonnage for a few apartments.

From now on the movement will reach out to the cheaper fuels, especially as soon as it dawns on the public that the failure to wash steam coal is going to curtail the production of domestic sizes.

The country call for domestic is almost identical with the city needs, but not so pronounced.

The steam situation shows no improvement. Screenings from all fields are piling up at the mines and this is the one cause for many mines being idle in the Williamson-Franklin County field. It is not as bad in the Mt. Olive district but affects the Standard mines to almost the same extent as in Williamson and Franklin Counties.

A survey of the steam trade for July indicates a decreased tonnage and unless something out of the ordinary takes place in the local industrial situation in the next two months the steam tonnage will have to be dumped at the mines if anywhere near the amount required for domestic use is to be produced in all of the fields.

The mines in the Standard field work one and two days a week, except when on railroad coal. This tonnage does not indicate that the roads are storing to any extent. Many mines are idle and those that do work for the most part fight for the little business offered by selling below cost. An effort was made by some operators on July 1 to get more money, but it was not general and so far has not been successful.

The Mt. Olive field is fairly well taken care of in shipping north and northwest. Some railroad fuel is moving, and steam coal from this field moves easier than from other fields if it can go north.

The situation in Williamson and Franklin Counties is a vexatious problem for the operator. Snowed under in the past two weeks with domestic orders and no place for steam sizes makes it hard to give the men work enough to keep them contented. Two days a week is not enough, especially for the foreign element who are ready to leave at the first chance. One or two mines are working steady out of the entire field and some are idle entirely.

Cars are plentiful yet and the movement is good. Prices are well maintained on all sizes by the Association operators, while the independents are quoting as much as 50c. less.

No contracts reported except at price at time of shipment.

Coal and Coke Securities

New York Stock Exchange Closing Quotations July 7, 1919

STOCKS		Bid	Asked	BONDS		Bid	Asked
American Coal Co. of Allegheny.....	(ACL)	45	...	Cahaba Coal, 1st Gtd. 6s, 1922.....		97	...
Burns Brothers, Com.....	(BB)	148	152	Clearfield Bituminous Coal, 1st 4s, Ser. A, 1940.....		75 1/2	...
Burns Brothers, Pfd.....	(BB)	99 1/2	115	Colorado Fuel & Iron, Gen. 5s, 1943.....		90	90 1/2
Central Coal & Coke, Com.....	(CK)	55	...	Colorado Indus. 1st Mtg. & Col. Tr. 5s, 1934.....		80 1/2	80 1/2
Central Coal & Coke, Pfd.....	(CK)	63	...	Consolidation Coal of Maryland, 1st Ref. 5s, 1950.....		87 1/2	88
Colorado Fuel & Iron, Com.....	(CF)	51	52 1/2	Jefferson & Clearfield Coal & Iron, Sec. Mort. 5s, 1926.....		98	...
Colorado Fuel & Iron, Pfd.....	(CF)	105	125	Lehigh Valley Coal, 1st Gtd. 5s, 1933.....		100	101
Consolidation Coal of Maryland.....	(CGM)	75	...	Lehigh Valley Coal, Gtd. Int. Red. to 4% 1913.....		79 1/2	...
Elk Horn Coal, Com.....	(EB)	37	37 1/2	Lehigh Val. Coal & Nav. Con. S. F., 4 1/2s, Ser. A, 1954.....		90	...
Elk Horn Coal, Pfd.....	(EB)	...	47	Pleasant Valley Coal, 1st S. F., 5s, 1928.....		80 1/2	...
Island Creek Coal, Com.....	(ICR)	39	...	Pocahontas Coal & Coke, Joint 4s, 1941.....		83 1/2	84 1/2
Island Creek Coal, Pfd.....	(ICR)	75	...	Pocahontas Con. Collieries, 1st S. F., 5s, 1957.....		86 1/2	87 1/2
Jefferson & Clearfield Coal & Iron, Pfd.....	(JF)	63	...	Roch. & Pitta. Coal & Ir., Helvetia Pur. Money 5s, 1946.....		98	...
New Central Coal of West Va.....	(NCC)	5	...	St. L. Rocky Mnt. & Pac. Stamped 5s, 1955.....		...	81
Pittsburgh Coal, Com.....	(PC)	68	69	Tenn. Coal, Iron & R. R., Gen. 5s, 1951.....		93	...
Pittsburgh Coal, Pfd.....	(PC)	93	95	Utah Fuel, 1st Sinking Fund 5s, 1931.....		87	...
Pond Creek Coal.....	(PD)	18	19 1/2	Victor Fuel, 1st Mtg. Sinking Fund 5s, 1953.....		55	70
Virginia Iron, Coal & Coke.....	(VK)	...	67	Virginia Iron, Coal & Coke 1st 5s, 1949.....		85 1/2	88 1/2

CURRENT PRICES—MATERIALS & SUPPLIES

IRON AND STEEL

PIG IRON—Quotations compiled by The Matthew Addy Company as per Department of Commerce Committee Schedule.

	Current	One Month Ago
CINCINNATI		
No. 2 Southern	\$30.35	\$30.35
Northern Basic	27.55	27.55
Southern Ohio No. 2	28.55	28.25
NEW YORK, Tidewater delivery		
2X Virginia (silicon 2.25 to 2.75)	31.90	31.90
Southern No. 2 (silicon 2.25 to 2.75)	33.95	33.95
BIRMINGHAM		
No. 2 Foundry	26.25	25.25
PHILADELPHIA		
Eastern Pa.	30.65*	30.65
Virginia No. 2	30.85†	30.85
Basic	30.90*	30.90
Grey Forge	29.90*	30.90
CHICAGO		
No. 2 Foundry Local	26.75	26.75
No. 2 Foundry Southern	28.00	32.00
PITTSBURGH, including freight charge from the Valley		
No. 2 Foundry Valley	28.15	28.15
Basic	27.15	27.15
Bessemer	29.35	29.35

* F.o.b. furnace. † Delivered.

STRUCTURAL MATERIAL—The following are the base prices, f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill Pittsburgh	Current	New York One Year Ago	St. Louis	Chicago
Beams, 3 to 15 in.	\$2.45	\$3.47	\$4.24	\$3.54	\$3.47
Channels, 3 to 15 in.	2.45	3.47	4.24	3.54	3.47
Angles, 3 to 6 in., 1/2 in. thick	2.45	3.47	4.24	3.54	3.47
Tees, 3 in. and larger	2.45	3.52	4.24	3.54	3.47
Plates	2.66	3.67	4.49	3.54	3.67

BAR IRON—Prices in cents per pound at cities named are as follows:

	Pittsburgh	Cincinnati	St. Louis	Denver	Birmingham
2.75	3.25	3.44	4.30	3.50	

NAILS—Prices per keg from warehouse in cities named:

	Mill Pittsburgh	St. Louis	Denver	Chicago	Birmingham	San Francisco	Dallas
Wire	\$3.25	\$3.90	\$4.90	\$3.90	\$4.25	\$5.00	\$5.00
Cut	4.25	5.40	5.61	5.50		6.40	6.40

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh	Chicago	St. Louis	San Francisco	Birmingham	Denver
Standard railroad spikes 1/2-in. and larger	\$3.35	\$4.27	\$4.44	\$5.65	\$4.50	\$5.05
Track bolts	4.35	5.17	Prem.	6.65	6.00	6.05
Standard section angle bars	3.00	4.22	Prem.	4.60		4.45

COLD DRAWN STEEL SHAFTING—From warehouse to consumers requiring fair-sized lots, the following discounts hold:

	Cincinnati	Cleveland	Chicago	St. Louis	Denver	Birmingham
17 1/2%	List -5%	List -2%	+15%	+20%	+20%	

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill Pittsburgh	Cincinnati	Chicago	St. Louis	Denver	Birmingham
Straight	\$5.75	\$7.50	\$6.50	\$7.25	\$8.15	\$7.00
Assorted	6.40	7.50	6.50-7.00	6.40	8.40	7.25

Cincinnati—Horseshoe nails sell for \$4.50 to \$5 per 25-lb. box.

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	Current	New York One Month Ago	Year Ago	Chicago	St. Louis	San Francisco	Dallas
4 in.	\$53.00	\$55.70	\$64.35	\$54.80	\$48.00	\$72.50	\$59.00
6 in. and over	50.00	52.70	61.35	51.80	45.00	69.55	56.00

Gas pipe and 16-ft. lengths are \$1 per ton extra.

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	Current	One Year Ago	Current	One Year Ago
Standard Bessemer rails	\$45.00	\$55.00	\$45.00	\$65.00
Standard openhearth rails	47.00	57.00	47.00	67.00
Light rails, 8 to 10 lb.	2.58*	3.13*	2.84*	3.13*
Light rails, 12 to 14 lb.	2.54*	3.09*	2.79*	3.09*
Light rails, 25 to 45 lb.	2.45*	3.00*	2.70*	3.00*

* Per 100 lb.

OLD MATERIAL—The prices following are per gross ton paid to dealers and producers in New York. In Chicago and St. Louis the quotations are per net ton and cover delivery at the buyer's works, including freight transfer charges:

	New York	Chicago	St. Louis
No. 1 railroad wrought	\$19.50	\$17.00	\$18.50
Stove plate	15.50	17.00	17.00
No. 1 machinery cast	21.50	21.50	23.50
Machine shop turnings	9.00	6.65	9.00
Cast borings	9.50	9.50	9.00
Railroad malleable cast	14.00	16.00	15.50

COAL BIT STEEL—Warehouse price per pound is as follows:

	New York	Cincinnati	Birmingham	St. Louis	Denver
	\$0.12	\$0.16	\$0.18	\$0.13	\$0.18

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham
Solid	14c.	13c.	15c.
Hollow	18c.		

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh; basing card of Jan. 1, 1919 for steel pipe and for iron pipe:

	Steel Black	Galvanized	Iron Black	Galvanized
Inches 1/2 and 3/4	50 1/2%	24%	39 1/2%	23 1/2%
1/2 to 3	54 1/2%	40%		
1 to 3	57 1/2%	44%		

	Steel Black	Galvanized	Iron Black	Galvanized
2	50 1/2%	35%	32 1/2%	18 1/2%
2 1/2 to 6	53 1/2%	41%	34 1/2%	21 1/2%

	Steel Black	Galvanized	Iron Black	Galvanized
1/2 and 1	46 1/2%	29%	39 1/2%	24 1/2%
1 to 1 1/2	51 1/2%	39%		
1 1/2 to 1 1/2	55 1/2%	43%		

	Steel Black	Galvanized	Iron Black	Galvanized
2	48 1/2%	37%	33 1/2%	20 1/2%
2 1/2 to 4	51 1/2%	40%	35 1/2%	23 1/2%
4 1/2 to 6	50 1/2%	39%	34 1/2%	22 1/2%

Stocks discounts in cities named are as follows:

	New York Gal.	Cleveland Gal.	Chicago Gal.
3 to 3 in. steel butt welded	47%	31%	46%
3 1/2 to 3 in. steel lap welded	42%	27%	42%

Malleable fittings. Class B and C, from New York stock sell at list + 12 1/2% Cast iron, standard sizes, 10% off.

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York and St. Louis
Galvanized iron rigging	+12 1/2%
Galvanized cast steel rigging	7 1/2%
Bright plain rigging	35%
Bright cast steel	22 1/2%
Bright iron and iron tiller	5%

STEEL SHEETS—The following are the prices in cents per pound from jobbers' warehouse at the cities named:

	Pittsburgh, Mill in Carloads	New York Current	One Month Ago	One Year Ago	Cleveland Current	Chicago Current
*No. 28 black	4.35	5.37	6.22	6.45	5.27	5.37
*No. 26 black	4.25	5.27	6.12	6.35	5.17	5.27
*Nos. 22 and 24 black	4.20	5.22	6.07	6.30	5.12	5.22
Nos. 18 and 20 black	4.15	5.17	6.02	6.25	5.07	5.17
No. 16 blue annealed	3.75	4.77	5.37	5.65	4.67	4.77
No. 14 blue annealed	3.65	4.67	5.27	5.55	4.57	4.67
No. 10 blue annealed	3.55	4.57	5.17	5.45	4.47	4.57
*No. 18 galvanized	5.70	6.50	7.57	7.70	6.62	6.72
*No. 26 galvanized	5.40	6.20	7.27	7.40	6.32	6.42
No. 24 galvanized	5.25	6.05	7.12	7.25	6.17	6.27

* For painted corrugated sheets add 30c. per 100 lb. for 25 to 28 gage; 25c. for 19 to 24 gages; for galvanized corrugated sheets add 15c., all gages.

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair sizes orders, the following amount is deducted from list:

	New York Current	Cleveland Current	Chicago Current	St. Louis Current
Hot pressed square	\$1.28	\$1.90	\$1.40	\$2.00
Hot pressed hexagon	1.08	1.90	1.20	2.00
Cold punched square	3.25	1.90	.75	1.30
Cold punched hexagon	2.70	1.90	.75	1.30

Semi-finished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	50-10%	40%
Chicago	50%	50%
Cleveland	60-10-10%	60%
St. Louis	45%	

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago	St. Louis
1/2 by 4 in. and smaller	50-10%	50%	50-10%	50-10%
Larger and longer up to 1 in. by 30 in.	40-10%	40%	40-10%	40-10%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

	New York	Cleveland	Chicago	St. Louis
For wrought-iron washers:				
New York	\$1.25	\$3.50	\$2.25	
For cast-iron washers the base price per 100 lb. is as follows:				
New York	\$6.00	\$3.75	\$4.00	

RIVETS—The following quotations are allowed for fair sized orders from warehouse:

	New York	Cleveland	Chicago
Steel 1/2 and smaller	65%	60-5%	45%
Tinned	65%	60-5%	40%
Boiler, 1/2, 1 in. diameter by 2 in. to 5 in. sell as follows per 100 lb.:			
New York	\$4.72	\$4.00	\$4.87
Structural, same sizes:			
New York	\$4.82	\$4.10	\$4.97
Pittsburgh			\$4.75

CONSTRUCTION MATERIALS**LINSEED OIL**—These prices are per gallon:

	New York	Cleveland	Chicago
Current	One	One	One
Year Ago	Year Ago	Year Ago	Year Ago
Raw in barrel	\$1.98	\$1.61	\$2.04
5-gal. cans	2.11	1.71	2.24

WHITE AND RED LEAD—Base price.

	Current	Red	White
	Current	1 Year Ago	Current
	Dry	In Oil	Dry
100-lb. keg	13.00	14.50	12.25
25 and 50-lb. kegs	13.25	15.75	12.75
121-lb. keg	13.50	15.00	12.75
5-lb. cans	15.00	16.50	14.00
1-lb. cans	16.00	17.50	14.50
500 lb. lots less 10% discount.			2000 lb. lots less 10-21% discount.

COMMON BRICK—The prices per 1000 in cargo or carload lots are as follows:

Chicago	\$12.00	Birmingham	\$15.00
St. Louis, salmon	10.00	Denver (hard red)	12.00
Cincinnati	16.00		

PREPARED ROOFINGS—Standard grade rubbered surface, complete with nails and cement, costs per square as follows in New York, St. Louis, Chicago and San Francisco.

	C.I.	1-Ply	C.I.	2-Ply	C.I.	3-Ply
No. 1 grade	\$1.45	\$1.70	\$1.80	\$2.05	\$2.15	\$2.40
No. 2 grade	1.30	1.55	1.60	1.85	1.90	2.15

Asbestos asphalt saturated felt (14 lb. per square) costs \$5.00 per 100 lb. Slate-surfaced roofing (red and green) in rolls of 108 sq. ft. costs \$2.00 per roll in carload lots and \$2.25 for smaller quantities. Shingles, red and green slate finish cost \$5.00 per square in carloads, \$5.25 in smaller quantities, in Philadelphia.

ROOFING MATERIAL—Prices per ton f. o. b. New York and Chicago:

	N. Y.	Chicago	N. Y.	Chicago
Tar felt (14 lb. per square of 100 sq. ft.)	\$60.00	\$60.50	\$61.00	\$61.50
Tar pitch (in 400-lb. bbl.)	21.00	18.00	22.00	19.00
Asphalt pitch (in barrels)	34.00	34.00	37.50	37.50
Asphalt felt	63.00	63.00	67.50	67.50

HOLLOW TILE—Price per block in carload lots for hollow building tile:

	4x12x12	8x12x12	12x12x12
St. Paul	\$0.056	\$0.11	\$0.162
St. Louis	.08	.15	.30
Seattle	.09	.175	.30
Los Angeles	.082	.154	.236
New Orleans	.10	.22	.325
Pittsburgh	.065	.115	
Chicago	.08	.144	
Denver	.125	.18	
Cincinnati	.07	.13075	

*F. o. b. factory, 4, 8 and 10 inch.

LUMBER—Price of pine per M in carload lots:

	1-In. Rough	2-In. T. and G.	8 x 8 In. x 20 Ft.
	10 In. x 16 Ft.	10 In. x 16 Ft.	
St. Louis	\$30.51	\$35.00	\$33.00
Birmingham	39.00	33.00	31.00
Denver	43.25	35.00	43.00
Cincinnati	41.00	39.00	40.00

EXPLOSIVES—Price per pound of dynamite in small lots and price per 25-lb. keg for black powder:

	Low Freezing	Gelatin	Black Powder
	20%	40%	60%
New York	\$0.271	\$0.271	\$0.30
Boston	.24	.24	.31
Kansas City	.19	.23	.30
New Orleans	.221 (50%)	.23	.24
Seattle	.14	.18	.21
Chicago	.18	.21	.25
St. Paul	.19	.22	.26
St. Louis	.19	.21	.23
Denver	.171	.225	.24
Dallas	.189	.225	.288
Los Angeles	.196	.237	.251

MISCELLANEOUS**GREASES**—Prices are as follows in the following cities in cents per pound for barrel lots:

	Cincinnati	St. Louis	Birmingham	Denver
Cup	7	7	8 1/2	14 1/2
Fiber or sponge	8	13	8 1/2	18
Transmission	7	13	8 1/2	17
Axle	4 1/2	4 1/2	4 1/2	5 1/2
Gear	4 1/2	7 1/2	8 1/2	8
Car journal	22 (cal.)	4 9	8 1/2	8

BABBITT METAL—Warehouse prices in cents per pound:

	New York	Cleveland	Chicago
Current	One	One	One
Year Ago	Year Ago	Year Ago	Year Ago
Best grade	87.00	125.00	79.00
Commercial	42.00	70.00	17.50

HOSE—Following are prices of various classes of hose:

	Fire	50-Ft. Length
Underwriters' 2 1/2-in.		70c. per ft.
Common, 2 1/2-in.		40%
	Air	
	First Grade	Second Grade
2-in. per ft.	\$0.50	\$0.35
	Third Grade	\$0.25
First grade	30%	Second grade
	40%	Third grade
	40-10%	

LEATHER BELTING—Present discounts from list in cities named:

	Medium Grade	Heavy Grade
St. Louis	45%	50%
Denver	35-5%	30%
Birmingham	35%	35%
Chicago	45%	35%
Cincinnati	30-5-2 1/2%	40-2 1/2%

RAWHIDE LACING—20% for cut; 45c. per sq. ft. for ordinary.**PACKING**—Prices per pound:

Rubber and duck for low-pressure steam	\$0.90
Asbestos for high-pressure steam	1.00
Duck and rubber for piston packing	1.00
Flax, regular	1.20
Flax, waterproofed	1.60
Compressed asbestos sheet	1.00
Wire insertion asbestos sheet	1.20
Rubber sheet	.60
Rubber sheet, wire insertion	.80
Rubber sheet, duck insertion	.50
Rubber sheet, cloth insertion	.30
Asbestos packing, twisted or braided, and graphited, for valve stems and stuffing boxes	1.20
Asbestos wick, 1/2- and 1-lb. balls	.85

MANILA ROPE—For rope smaller than 1-in. the price is 1/2 to 2c. extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: 1/2-in., 8 ft., 1-in., 6; 1 1/2-in., 4 1/2; 2-in., 3 1/2; 2 1/2-in., 2 ft. 10 in.; 3-in., 2 ft. 4 in. Following is price per pound for 1-in. and larger, in 1200-ft. coils:

Boston	\$0.26	Atlanta	\$0.291
New York	.27	Denver	.28
St. Louis	.26 1/2	Kansas City	.28
Chicago	.26 1/2	New Orleans	.27
St. Paul	.26	Seattle	.27
San Francisco	.26	Los Angeles	.26

PIPE AND BOILER COVERING—Below are discounts and part of standard lists:

	PIPE COVERING	BLOCKS AND SHEETS
Pipe Size	Standard List	Price
	Per Lin. Ft.	per Sq. Ft.
1-in.	\$0.27	\$0.27
2-in.	.36	.30
6-in.	.80	.45
4-in.	.60	.60
3-in.	.45	.75
8-in.	1.10	.90
10-in.	1.30	1.05
85% magnesia high pressure		List
For low-pressure heating and return lines		4-ply... 58% off
		3-ply... 60% off
		2-ply... 62% off

WIRING SUPPLIES—New York prices for tape and solder are as follows:

Friction tape, 1/2 lb. rolls	48c. per lb.
Rubber tape, 1/2 lb. rolls	60c. per lb.
Wire solder, 50-lb. spools	46c. per lb.
Soldering paste, 2-oz. cans	\$1.20 per doz.

COPPER WIRE—Prices per 1000 ft. for rubber-covered wire in following cities.

	Denver	St. Louis	Birmingham
	Single	Double	Single
No.	Braid	Braid	Braid
14	\$12.00	\$15.50	\$33.00
10	18.85	25.45	49.50
8	26.45	33.70	68.00
6	40.00	45.70	86.00
4	56.35	64.30	112.48
2	84.85	94.35	158.76
1	111.00	123.35	176.00
0	163.00	163.00	222.00
00	196.85	270.00	302.78
000	238.85	330.00	366.00
0000	289.85	400.00	439.74

Cincinnati is using a 20-cent base, with 55 to 58% discount.

FREIGHT RATES—On finished steel products in the Pittsburgh district including plates, structural shapes, merchant steel, bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains etc., the following freight rates per 1000 lb. are effective:

Boston	\$0.30	New Orleans	\$0.381
Buffalo	.17	New York	.27
Chicago	.27	Philadelphia	.241
Cincinnati	.23	St. Louis	.24
Cleveland	.17	St. Paul	.49*
Denver	.99	Pacific Coast (all rail)	1.25*
Kansas City	.59		

Note—Add 3% transportation tax. Minimum carload, 80,000 lb.